

# 2006 Parallax Product Catalog



PARALLAX

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Catalog design and layout by Jen Jacobs and Larissa Crittenden  
Product photography, line drawings, and schematics by Rich Allred.

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# Welcome to the 2006 Parallax Product Catalog

We have a whole host of new products for you to enjoy this year, and we have still left room for some fabulous customer applications and try-at-home projects.

## What's new at Parallax for 2006?

- **Scribbler™ Robot:** Fully assembled and programmable with PBASIC text or with the Scribbler Program Maker graphical software, it's a perfect first real robot for ages 8+. (pages 30-31)
- **Propeller™ chip:** eight simultaneous 32-bit processors with high-level object-oriented programming (pages 78-79)
- **SX/B compiler and the SX:** free BASIC compiler for 50 MIPS microcontrollers (page 74)
- **Parallax EFX:** special effects group provides easy-to-use controllers, sound effects and relay boards (pages 64-67)
- **SumoBot® Robot Competition Kit:** two robots, assembly manual, Stamps in Class tutorial and full-size Competition Ring poster (page 25)
- **Professional Development Board:** program all Parallax products (except Propeller) on this versatile and feature-rich board (page 11)
- *More interesting application products throughout our web site involving GPS, RFID, robotics, internet-controlled microcontrollers (PINK) and motor controllers (HB-25)*

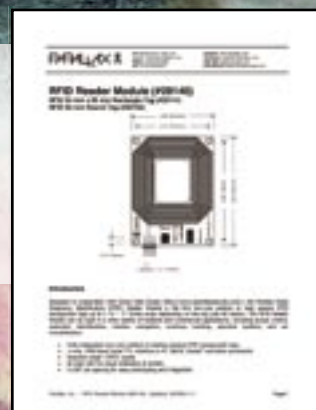
## FORUMS

Parallax maintains a very active discussion forum for all of our products (<http://forums.parallax.com>). Average response time is less than an hour or two, and a high level of discussion activity exists between the members. If you're using our products, you should visit the forums to further improve your experience.

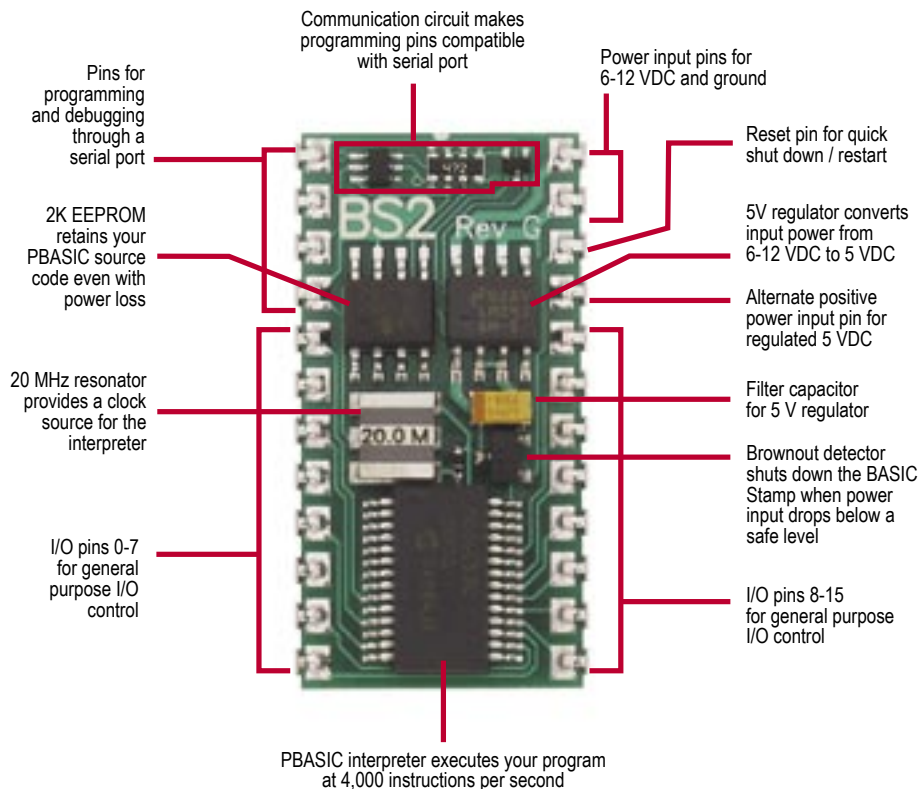


## Documentation and Software Downloads

The most extensive product-specific documentation for our products is usually shown where the product appears on the web site for sale, near the bottom of each page. We welcome input on our documentation by sending your comments to [editor@parallax.com](mailto:editor@parallax.com).



# BASIC Anatomy



## Programming in PBASIC

PBASIC is a very simple, elegant, and powerful language that allows anyone to program a microcontroller. And in case you were wondering, PBASIC stands for Parallax Beginner's All-purpose Symbolic Instruction Code. The foundation of our language is designed around standard BASIC and the commands are terms such as PULSOUT or SERIN which are hardware driven commands. The beauty of the BASIC Stamp microcontroller is that you have the power to tell it exactly what to do, without going through any extra processes. This means high reliability and no guesswork. Using PBASIC allows you to save valuable time because the learning curve is short and the sample code and resources are abundant.

## Parallax CD-ROM

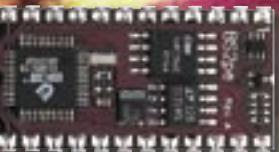
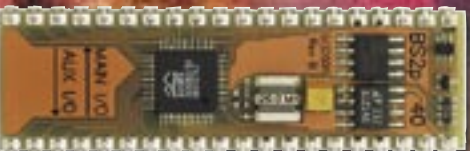
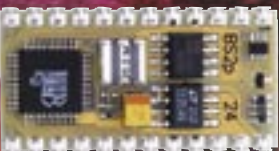
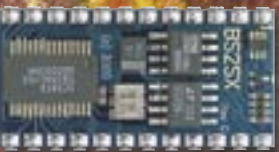
All of our programming software is available for free downloading on our web site. The software is also distributed in the Parallax CD-ROM which contains product documentation, support, etc. The CD-ROM is included in all of our starter kits and is also available for separate purchase (#27000; \$3.00).



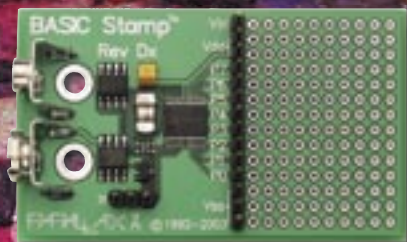
# BASIC Stamp 2 Module Comparison Chart

04

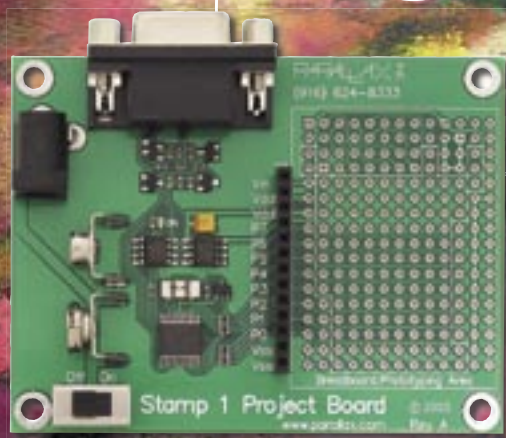
OUR BASIC STAMP 2-STYLE MODULES ARE EASY TO USE AND HAVE AN ENORMOUS AMOUNT OF EDUCATIONAL SUPPORT. THE STANDARD BS2-1C IS RECOMMENDED FOR BEGINNERS. EACH MODULE'S FEATURES VARY TO PROVIDE YOU WITH FLEXIBILITY TO SOLVE PROBLEMS.



NAME OF MODULE:	BASIC Stamp 2	BASIC Stamp 2e	BASIC Stamp 2sx	BASIC Stamp 2p24	BASIC Stamp 2p40	BASIC Stamp 2pe	BASIC Stamp 2px
STOCK CODE № AND PRICE	BS2-1C; \$49.00	BS2E-1C; \$54.00	BS2SX-1C; \$59.00	BS2P24-1C; \$79.00	BS2P40-1C; \$89.00	BS2PE-1C; \$75.00	BS2PX-1C; \$79.00
PROCESSOR SPEED:	20 MHz	20 MHz	50 MHz	20 MHz Turbo	20 MHz Turbo	8 MHz Turbo	32 MHz Turbo
PROGRAM EXECUTION SPEED:	~4,000 instructions/second	~4,000 instructions/second	~10,000 instructions/second	~12,000 instructions/second	~12,000 instructions/second	~6,000 instructions/second	~19,000 instructions/second
RAM SIZE:	32 bytes (6 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	32 Bytes (6 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)	38 Bytes (12 I/O, 26 Variable)
SCRATCHPAD RAM:	N/A	64 Bytes	64 Bytes	128 Bytes	128 Bytes	128 Bytes	128 Bytes
EEPROM (PROGRAM) SIZE:	2K Bytes, ~500 instructions	8 x 2K Bytes, ~4,000 instructions	8 x 2K Bytes, ~4,000 instructions	8 x 2K Bytes, ~4,000 instructions	8 x 2K Bytes, ~4,000 instructions	16 x 2K Bytes (16K for source), ~4,000 instructions	16 x 2K Bytes (16K for source), ~4,000 instructions
VOLTAGE REQUIREMENTS	5-15 VDC	5-12 VDC	5-12 VDC	5-12 VDC	5-12 VDC	5-12 VDC	5-12 VDC
CURRENT DRAW @ 5V	3 mA Run/ 50 uA Sleep	25 mA Run/ 200 uA Sleep	60 mA Run/ 500 uA Sleep	40 mA Run/ 350 uA Sleep	40 mA Run/ 350 uA Sleep	15 mA Run/ 150 uA Sleep	55 mA Run/ 450 uA Sleep
SOURCE/SINK CURRENT PER I/O	20 mA/25 mA	30 mA/30 mA	30 mA/30 mA	30 mA/30 mA	30 mA/30 mA	30 mA/30 mA	30 mA/30 mA
SOURCE/SINK CURRENT PER UNIT	40 mA/50 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins	60 mA/60 mA per 8 I/O pins
PBASIC COMMANDS	42	45	45	61	61	61	63



All BASIC Stamp 1 microcontrollers (including the Project Board) are rated for industrial temperatures (-40° C to +85° C (-40° F to +185° F)).



NAME	STOCK Nº	PRICE
BASIC STAMP REV.DX MODULE	27100	\$34.00

The original BASIC Stamp module. Often underestimated, but powerful enough for many of your applications. BASIC Stamp microcontroller and soldering prototype board all in one package.

NAME	STOCK Nº	PRICE
BASIC STAMP 1 MODULE	BS1-IC	\$29.00

Equivalent to the Rev.Dx, only in a 14-pin package. Ideal fit for applications with tight space limitations. Very low cost allows for inclusion in high-production projects and saves time over designing your own board.

NAME	STOCK Nº	PRICE
BASIC STAMP 1 SERIAL ADAPTER	27111	\$4.95

Add Windows® programming to your BASIC Stamp 1 module (BS1-IC). One end plugs into your serial cable and the other into a 3-pin header.

NAME	STOCK Nº	PRICE
BASIC STAMP 1 PROJECT BOARD	27112	\$29.00

This project board has a BASIC Stamp 1 microcontroller and Serial Adapter built onto the board! The board includes a 9V battery clip, a mechanically interlocked 2.1 mm power jack, DB-9 connector for programming, and LM2936 regulator providing 40 mA for your projects.

NAME	STOCK Nº	PRICE
NEW! BS1-USB MODULE	BS1USB	\$39.95

The BS1USB is a BASIC Stamp 1 with an on-board USB interface and USB-A connector. This handy little device is perfect for adding a user-definable function to your PC. For example, with a few lines of code and a little hardware, you can create a project timer/data logger to keep track of how much time you spend on a particular project that uploads the tallied information to your PC.

# The most complete way to get started with the BASIC Stamp microcontroller

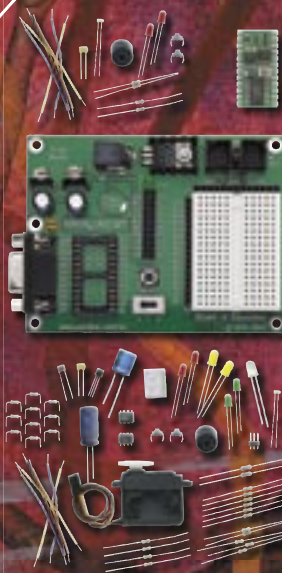
You will be able to do the following with this kit:

- Program the BASIC Stamp 2 microcontroller using a cable connected to your PC.
- Build 40+ hands-on activities using a solderless breadboard.
- Learn how to write your very own PBASIC (Parallax BASIC) programs.
- Solve real world engineering problems with a microcontroller.

NAME	STOCK №	PRICE
BASIC Stamp DISCOVERY KIT (SERIAL)	27207	\$149.00
BASIC Stamp DISCOVERY KIT (USB; NOT PICTURED)	27807	\$149.00

This is the most complete kit to get started with BASIC Stamp programming. Everything you need to program BASIC Stamp modules (except for the PC and power supply) is included. The BASIC Stamp Discovery Kit contains the BASIC Stamp 2 module, Board of Education carrier board, the *BASIC Stamp Manual*, and the *What's A Microcontroller? (WAM?)* parts and text.

The step by step learning approach of the WAM? guide and the most complete technical manual covering the BASIC Stamp microcontroller make this kit ideal as your first introduction to the world of Parallax microcontrollers. The Discovery Kit ships with a components package that includes jumper wires, handy tact switches, LEDs, a servo, and more all to get you building projects in no time upon opening the box. Whether you're an engineer being introduced to the BASIC Stamp microcontroller for the first time or if you're making your first foray into the high tech world of embedded systems, this kit is definitely a great place to start.



06



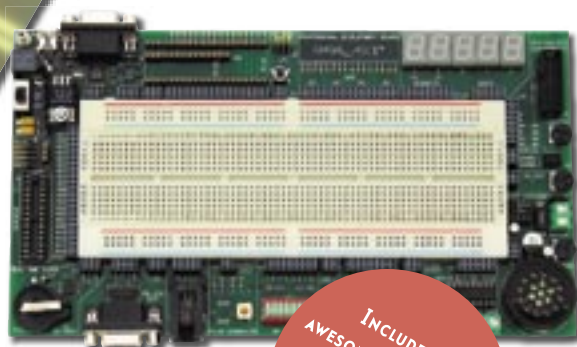
NEW!



## “Micro-Control” Your World with the new StampWorks Experiment Kit

NAME	STOCK Nº	PRICE
STAMPWORKS EXPERIMENT KIT	27297	\$249.00
STAMPWORKS MANUAL	27220	\$24.95

It's easy to get started micro-controlling your world with StampWorks. The *StampWorks* manual includes 35 experiments based on the BASIC Stamp 2 microcontroller and the Professional Development Board (included). StampWorks gives you the hardware, the electrical components and, most importantly, the know-how to become a confident embedded programmer. Working your way through *StampWorks* you will learn about efficient embedded design, connecting circuits and “smart” sensors to the BASIC Stamp, adding computer control to your projects, and “Power PBASIC” programming techniques.



INCLUDES THE  
AWESOME PROFESSIONAL  
DEVELOPMENT BOARD  
(PAGE 11)

After you've worked your way through *StampWorks* you'll be able to: flash LEDs, use 7-segment and LCD displays, monitor one or several push-buttons or switches, add sounds and sound effects to your projects, build a simple light-controlled Theremin, control servos and stepper motors, measure temperature, voltage, and so much more! When you are finished, you will be able to write your own BASIC Stamp programs to control your hobby, engineering, and student projects using a variety of electronic circuits – and you'll be able to do it with the confidence.

## BASIC Stamp 2P Family of Microcontroller Modules

NAME	STOCK Nº	PRICE
BASIC Stamp 2p24 MODULE	BS2P24-IC	\$79.00
BASIC Stamp 2p40 MODULE	BS2P40-IC	\$89.00

The BASIC Stamp 2p module (BS2p24 & BS2p40) has several advantages over all previous BASIC Stamp microcontrollers. It is 3 times faster than a BS2 and 20% faster than the BS2sx. Commands for interfacing with parallel LCDs, I<sup>2</sup>C devices and Dallas Semiconductor 1-Wire parts have been added along with a polled interrupt capability. Available in a pin-compatible format to other BS2 variants, or as a 40-pin module (with 16 extra I/O pins!). The BS2p24 may be interfaced with any Parallax carrier board with a 24-pin socket.

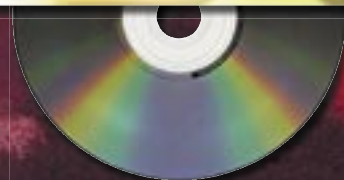
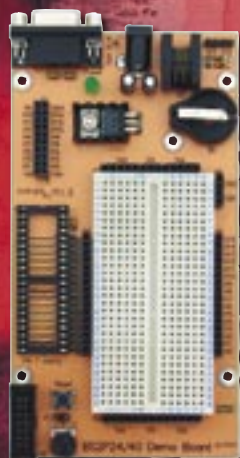
NAME	STOCK Nº	PRICE
BASIC Stamp 2pe MODULE	BS2PE-IC	\$75.00

The BS2pe has all the commands of the BS2p (LCD, I<sup>2</sup>C and 1-Wire) but twice the EEPROM size, 32 K (16 K for program) and much lower power consumption. Ideal for those who use the BS2p and would like a battery-powered or data-logging application. The program execution speed is 6,000 instructions/second compared to the BS2p at 12,000 instructions/second. The wake up interval is less than one millisecond, so the long term average current in SLEEP is much less. For low power or data logging applications, this will extend battery life and increase reliability.

NAME	STOCK Nº	PRICE
BASIC Stamp 2px MODULE	BS2Px-IC	\$79.00

The BS2px is the latest addition to the BASIC Stamp line of microcontrollers. It is 1.6 times faster than the BASIC Stamp 2p (execution approximately 19,000 PBASIC instructions/second) and includes a built-in voltage comparator (I/O pins P0, P1, and P2) as well as built-in, user-configurable Pull-up Resistor, Schmitt Trigger and Logic Threshold circuitry on every I/O pin.

In order to use the BASIC Stamp 2 family of modules, you'll need to download and install BASIC Stamp Editor v2.2 available for free at [www.Parallax.com](http://www.Parallax.com).



KIT IS  
AVAILABLE WITH A  
24-PIN OR A 40-PIN  
BASIC STAMP 2P  
MODULE.

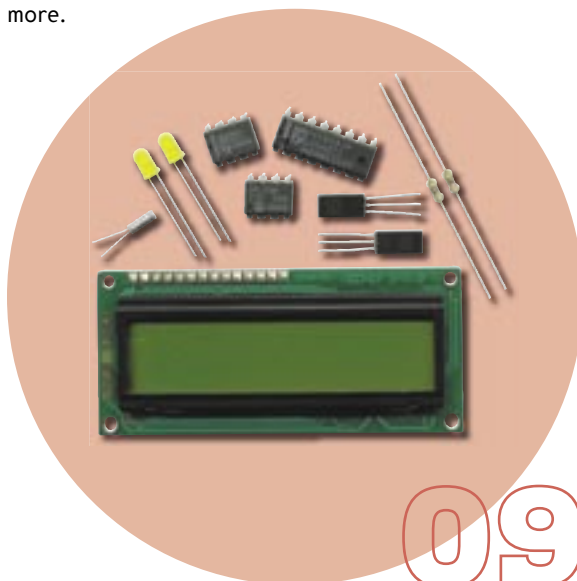
## BASIC Stamp 2p Professional Starter Kits

NAME	STOCK Nº	PRICE
BASIC Stamp 2p24 PROFESSIONAL STARTER KIT	27235	\$199.95
BASIC Stamp 2p40 PROFESSIONAL STARTER KIT	27238	\$199.95

Each of the BS2p24 and BS2p40 Professional Starter Kits are presented to engineers with a sampling of components such as a DS1822 thermometer and RTC w/RAM to test and get an immediate hands-on feel for the capabilities of the BS2p modules. This is especially handy when referring to the Philips I<sup>2</sup>C components and Dallas Semiconductor I-Wire components since the BS2p has special PBASIC commands to make interfacing very straightforward. A polled interrupt capability is also a key feature of the BS2p series. The **BS2p 24/40 Demo Board (#45187; \$89.00)** is also sold separately.

NAME	STOCK Nº	PRICE
BASIC STAMP 2p PLUS PACK	45184	\$69.00

This collection of parts is designed to interface with the BS2p modules and BS2p 24/40 Demo Board. Includes 2x16 LCD display w/cable, DS1822, DS2890-000, DS2405, 8 bit I/O Expander PCF8574P, 8-bit A/D and D/A PCF8591P, and RTC w/RAM PCF8583PN, and more.



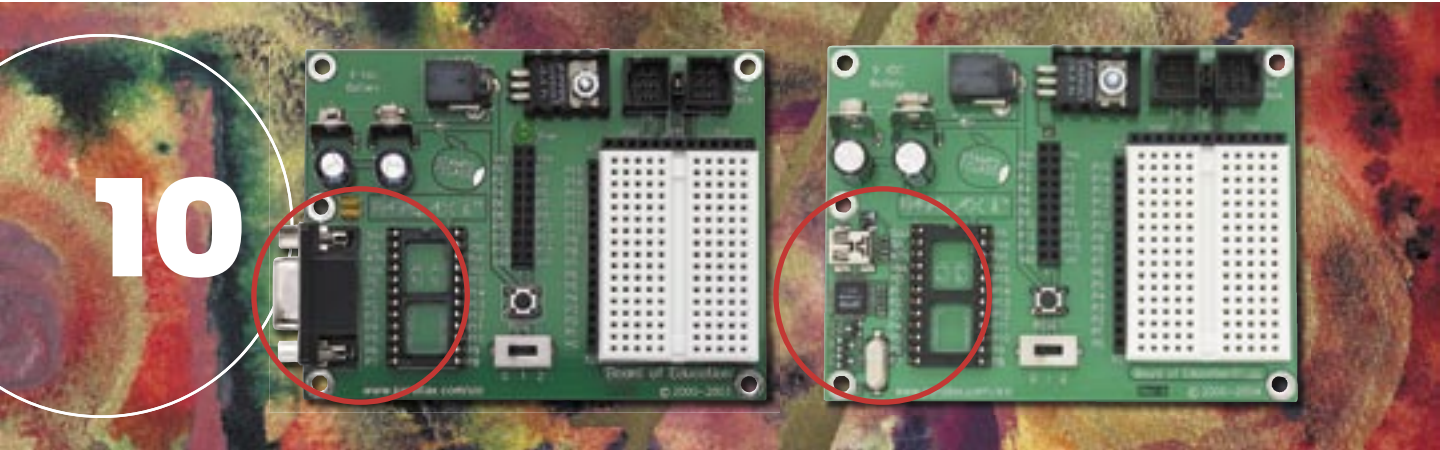
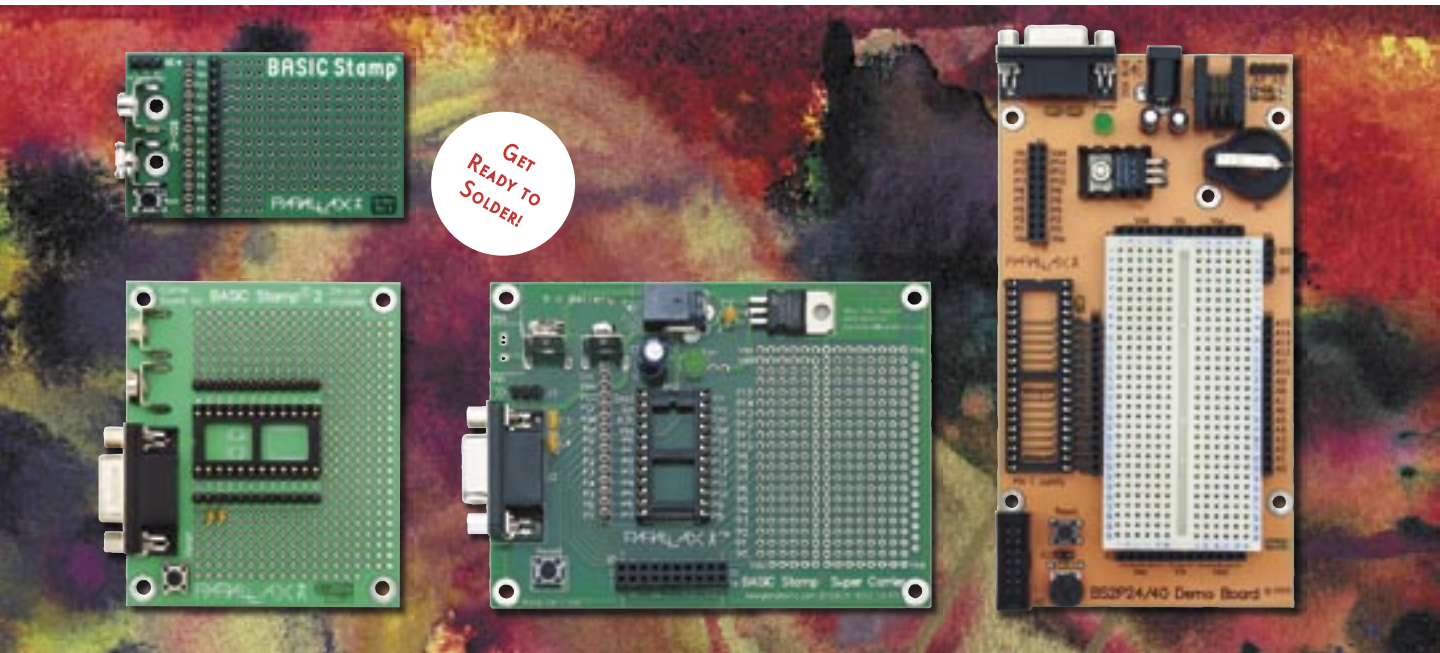
NAME	STOCK №	PRICE
BASIC Stamp 1 CARRIER BOARD	27110	\$15.00
BASIC Stamp 2 CARRIER BOARD	27120	\$24.00

These low-cost programming boards are suitable for your dedicated BASIC Stamp 1 and 2 projects. Note: BS1 Serial Adapter (#27111; \$4.95; page 05) must be purchased separately for use with BS1 Carrier Board.

NAME	STOCK №	PRICE
SUPER CARRIER BOARD	27130	\$19.95

Supports BS1-IC and all 24-pin BASIC Stamp modules.

NAME	STOCK №	PRICE
BS2P 24/40 DEMO BOARD	45187	\$89.00



NAME	STOCK №	PRICE
BOARD OF EDUCATION; SERIAL	28150	\$65.00
BOARD OF EDUCATION; USB	28850	\$65.00

Available with a Serial or a USB port, the Board of Education (BOE) programming board includes a handy power switch and 4 servo ports. A jumper near the servo ports will select either Vdd (5 V) or Vin (unregulated input voltage) to power the servos. The three-position

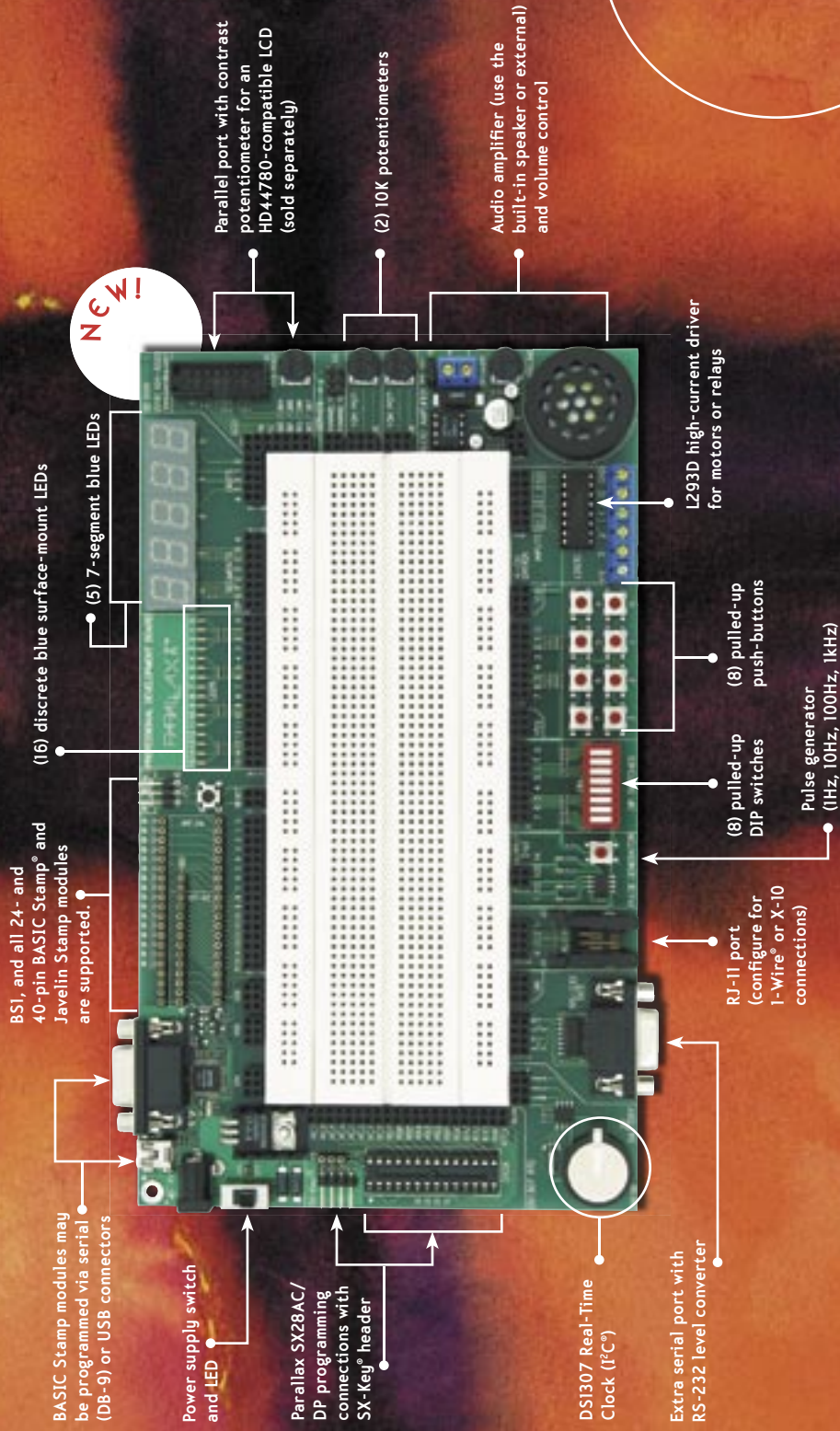
power switch is either off (0), power to everything but servo ports (1), or power to everything (2).

Our Board of Education programming board accepts any 24-pin BASIC Stamp module. You will need to purchase one separately, or find a starter kit which matches your needs. Options containing a BASIC Stamp 2 module include the designed-for-education “BOE” Full Kit (page 14) and the most comprehensive BOE-based selection, the BASIC Stamp Discovery Kit (page 06).

# Professional Development Board

NAME	Stock №	PRICE
PARALLAX PROFESSIONAL DEVELOPMENT BOARD	28138	\$149.00

Program all BASIC Stamp microcontrollers, Javelin Stamp, and the SX28AC/DP microcontroller with this feature-loaded development board. Popular I/O devices are built-in and a large breadboard provides plenty of prototype space.



# An Overview of Stamps in Class



The Stamps in Class™ program was created in 1998 to support education. To this day, we strive to provide educators with support materials to teach students a range of microcontroller-related skills. This includes disciplines such as programming, robotics, analog and digital, electronics, and process control. The keys to jump-starting Stamps in Class were the release of the Board of Education® programming platform (BOE; page 15), the availability of free educational texts via downloads, and the launching of our popular BASIC Stamp Educator's Courses. This 3-pronged effort of hardware, student guides, and training provided educators with a complete solution.

The BS2-IC microcontroller and the Board of Education platform have inspired students around the world to embark on engineering career paths. Today, Educator's Courses are held across the United States and in such places as Canada, New Zealand, The Netherlands, and Hong Kong. The combination of industry-quality hardware/electronics with hands-on training and free software, documentation, and support provides educators and students with the opportunity to learn and teach on the cutting edge.

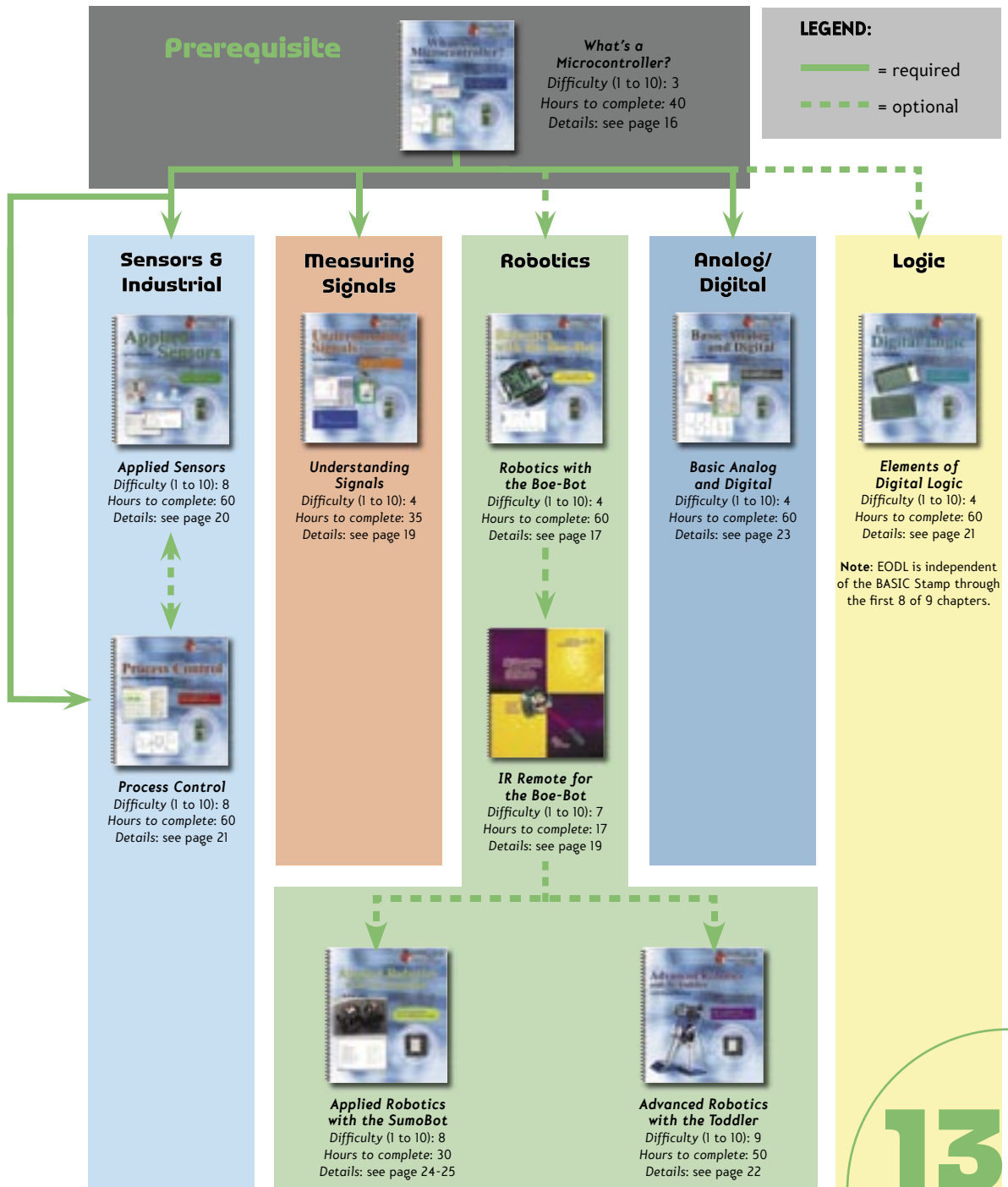
The Parallax Stamps in Class team consists of six authors, some within Parallax and others in universities. In 2003 we added a full-time editor to ensure that our texts were meeting professional editing standards. Each book requires approximately one to three years to develop, test, and distribute the first print. The Stamps in Class books are all available for free download and duplication by educators when used with the recommended Parallax Stamps in Class hardware.

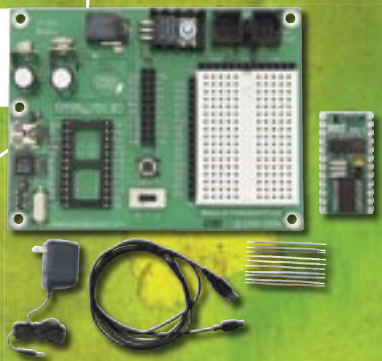


## Ready to get started with Stamps in Class?

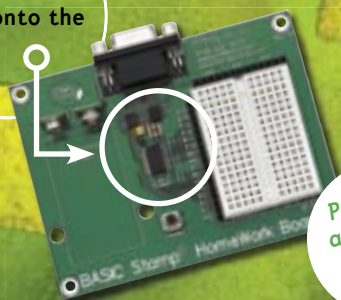
Use this handy flowchart to plot your path through the Stamps in Class tutorials. Once you have chosen texts that interest you, see how our different hardware kits work together on the hardware relationships overview (pages 14 and 15). If you are an educator, choose an introductory tutorial and follow the path along whichever subject track will be most applicable for your students.

**Please note:** while you can start with the *Robotics with the Boe-Bot* text, it is recommended that you have your class complete the *What's a Microcontroller?* text first. *What's a Microcontroller?* is our most complete introductory text that will explain all aspects of PBASIC programming to your students. Those students/classes who are already skilled in programming and circuit interacting do not need to complete the introductory texts to use to our higher level tutorials. Parallax's educational paths do not necessarily require a completion of the entire progression.





Has a BS2-IC built onto the board!



Purchase a 20-Pack for only \$750!

## Hardware Relationships Among Tutorials...

The following tutorials require the Board of Education Full Kit (top of this page):

- *What's a Microcontroller?* (page 16)
- *Robotics with the Boe-Bot* (page 17)
- *Basic Analog and Digital* (page 23)
- *Understanding Signals* (page 19)
- *Applied Sensors* (page 20)
- *Process Control* (page 21)

The following tutorials have unique hardware requirements...

- *Applied Robotics w/the SumoBot* (page 24-25)
- *Elements of Digital Logic* (page 21)
- *Advanced Robotics with the Toddler* (page 22)

*Elements of Digital Logic* uses the Digital Trainer Board (included in the EODL parts kit) for its experiments. The completion of the Chapter 9 experiment requires a BASIC Stamp 2 module (not included), which plugs directly into the Digital Trainer Board.

*Applied Robotics with the SumoBot* and *Advanced Robotics with the Toddler* are available only as full kits. The robots are programmed using a special board that has a BS2 microcontroller built right onto it!

NAME	STOCK Nº	PRICE
BOARD OF EDUCATION FULL KIT (SERIAL - NOT PICTURED)	28102	\$99.00
BOARD OF EDUCATION FULL KIT (USB)	28802	\$99.00

The Board of Education (BOE) Full Kit is our most popular educational kit. It includes the minimum equipment requirements for the Stamps in Class series. In addition to the Board of Education, it includes the BASIC Stamp 2 module (#BS2-IC; page 04), USB or serial cable, power supply, jumper wires, and CD-ROM with software and documentation. This is the lowest cost platform of choice for the Stamps in Class curriculum or for your own BASIC Stamp experiments. With the BOE Full Kit you'll need only to add a tutorial and parts kit to begin your BASIC Stamp explorations.

*If this is your first experience with the BASIC Stamp microcontroller, you may want to consider selecting the BASIC Stamp Discovery Kit (page 06).*

NAME	STOCK Nº	PRICE
BASIC STAMP HOMEWORK BOARDS - 10 PACK	28158	\$400.00

The HomeWork Board™ (HWB) was designed to be a low cost BASIC Stamp 2 platform for take-home or dedicated projects. Its similarity to the Board of Education has allowed it to become a viable replacement for the BOE/BS2 combination. You should note that the HomeWork Board doesn't have servo connections or a power supply jack, so we recommend the BOE if you plan to conquer *Robotics with the Boe-Bot*. *What's a Microcontroller?*, *Understanding Signals*, *Robotics with the Boe-Bot*, and *Applied Sensors* have been revised to support both Board of Education and HomeWork Board platforms.

**Educators Note:** Using HomeWork boards requires a few technical work-arounds for most Stamps in Class tutorials. It is ideal for student take-home projects and dedicated projects.

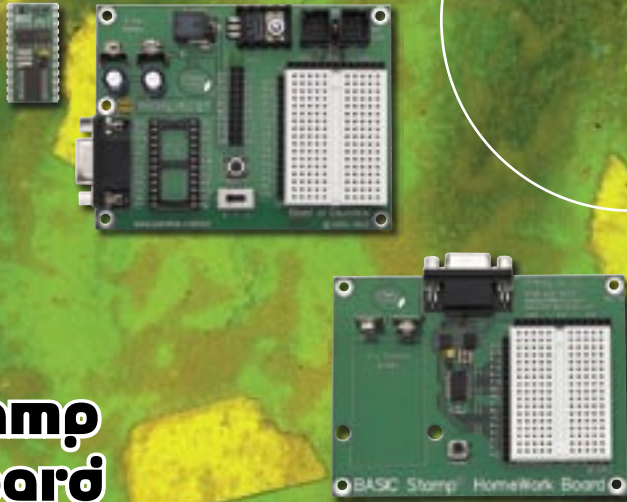
The HomeWork Board is included in Radio Shack's popular Parallax BASIC Stamp What's a Microcontroller Kit. Check [www.radioshack.com](http://www.radioshack.com) for more information (Radio Shack part #276-625).

# Board of Education and a BS2-IC

VS.

# The BASIC Stamp HomeWork Board

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The BASIC Stamp microcontroller is most commonly used in classrooms and laboratories in the 24-pin version socketed in the Board of Education (USB or Serial). Our Stamps in Class tutorials were originally written with the BS2/BOE in mind. This is absolutely our best hardware for Stamps in Class and our preference for the most versatile user experience.

A potential alternative is the BASIC Stamp HomeWork Board, a low-cost board similar to the Board of Education with a BASIC Stamp 2 microcontroller built right into the PCB. The lower cost HomeWork Board makes it ideal for take-home projects and dedicated uses. Read the table below for a comparison of features:

	BASIC STAMP 2 / BOARD OF EDUCATION	BASIC STAMP HOMEWORK BOARD
COST	~\$99/each in Board of Education Full Kit (#28102-serial/#28802-USB; quantity discounts available)	\$40/each, but available only in 10-packs (#28158)
BASIC STAMP	BASIC Stamp 2 (#BS2-IC) module may be removed from the board for other projects	BS2 module built directly on to the printed circuit board
I/O PROTECTION	None, requires attentive wiring/programming	220 ohm resistors built into each I/O pin
SIZE	3" x 4"	3" x 4"
POWER SUPPLY	9V battery / 2.1 mm jack for wall-pack provides 5V and unregulated input voltage	9V battery only (not included)
VOLTAGE REGULATOR	LM2940 can sink/source up to 1 Amp, plenty of power for small robotics, hobby and educational projects	LM2936 sink/source up to 50 mA, enough for small projects unless a second power supply is introduced
SERVO PORTS	(4) servo connections	None, but may be done on breadboard with 3-pin headers
SUPPORT PROVIDED IN STAMPS IN CLASS TUTORIALS	All Stamps in Class books <i>Applied Robotics with the SumoBot</i> , <i>Advanced Robotics with the Toddler</i> and <i>Elements of Digital Logic</i> have their own unique hardware, utilizing the BS2-IC.	Specific support in <i>What's a Microcontroller?</i> , <i>Robotics with the Boe-Bot</i> , <i>Applied Sensors</i> , and <i>Understanding Signals</i> .

The HomeWork Board may appear less robust, but it's a favorite of many customers and every bit as capable as a Board of Education depending on how you provide power. On the HomeWork Board, the power LED is only lit while the BASIC Stamp microcontroller is running a program, so you could put it in SLEEP/NAP for months and still use the same 9V battery.



## What's a Microcontroller?

Our most popular introductory tutorial, *What's a Microcontroller?* is the best place to begin learning BASIC Stamp programming. The text is highly developed with over 40 hands-on activities and complete PBASIC 2.5 support. This tutorial is perfect for aspiring engineers; embedded control engineers will continue to be in high demand.

NAME	STOCK №	PRICE
"WAM" PARTS KIT & TEXT	28152	\$65.00
"WAM" PARTS ONLY	28122	\$39.00

As titled, *What's a Microcontroller?* (WAM) answers the question of how to design customized, intelligent inventions using the BASIC Stamp 2 module. The activities incorporate a variety of fun and engaging experiments that appeal to one's imagination using motion, light, sound, and tactile feedback to introduce new concepts. These activities are designed to introduce the user to many basic principles in the fields of computer programming, electricity and electronics, mathematics, and physics. Many of the activities facilitate a hands-on presentation of design practices used by engineers and technicians in the creation of modern machines and appliances, using inexpensive and easy to obtain parts. This text is designed to accommodate a wide range of ages and skill levels.

The *What's a Microcontroller?* activity highlights include the following which are all intended to enhance multisensory involvement:

- Reaction timer game
- Potentiometer-controlled servo
- 7-segment LED light meter
- Nokia cell phone ring tone player

The last activity in each chapter typically involves an example project that makes the concepts that were introduced up to that point more tangible. The first activity in a given chapter is hands-on so that students can discover how the electrical/electronic component works before controlling/sensing it with the BASIC Stamp microcontroller and a program. The intermediary activities introduce techniques that either support the project in the previous activity or one of the projects from the aptly titled "Projects" section at the end of the chapter.

Throughout the text, you are writing and downloading PBASIC code to a BASIC Stamp module, building circuits on a breadboard, and implementing them with components which include: LEDs (light emitting diodes), a 7-segment display, resistors, capacitors, a piezo speaker, pushbuttons, and a servo. Upon completion of WAM, you will have a solid understanding of writing your own PBASIC programs and building custom circuits to get the results you want.

**Note:** The Board of Education Full Kit (#28102) is required to use this *Stamps in Class* text. The *HomeWork Board* is also fully supported in this text. For an even more complete starting point, check out the *BASIC Stamp Discovery Kit* on page 06.

# Robotics with the Boe-Bot

NAME	STOCK Nº	PRICE
"ROBOTICS" PARTS KIT & TEXT	28154	\$119.00
"ROBOTICS" PARTS ONLY	28124	\$109.00

The *Robotics with the Boe-Bot* tutorial is designed to meet the needs for everyone from middle school students to University engineering students to hobbyists to scientists. After all, the BASIC Stamp module used to control this robot is the same microcontroller used in professional applications. Once you have completed *Robotics with the Boe-Bot*, you will be confident with programming, building circuits, reading schematics, and solving problems with a microcontroller.

The programming of the Boe-Bot® robot is covered

in complete detail, beginning with the explanation of servo motors. You'll learn how to use PBASIC commands that will give you complete control of this robot. The first navigation activities start with controlling the robot by sending commands to the servos for traveling predetermined distances and making turns with no concern for the robot's environment. As you proceed through the *Robotics* text, you'll become familiar with advanced programming techniques to use with sensors for ultimate control, feedback, and autonomous navigation. Frequency sweep programming will allow you to even make one Boe-Bot follow another, or as a solo activity you can make the robot follow the edge of a table without falling off!

**Note:** For the lowest cost, all-in-one kit, order the *Boe-Bot Robot Kit* as featured on page 27. If you are ordering only the *Robotics* parts kit (#28124) you will also need to order a *Board of Education Full Kit* (#28102; page 14). The *HomeWork Board* is also fully supported in this text.



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## IR Remote for the Boe-Bot

NAME	STOCK Nº	PRICE
"IR REMOTE" BOOK ONLY	70016	\$15.00
"IR REMOTE" BOOK & PARTS KIT	28139	\$24.95
"IR REMOTE" PARTS KIT ONLY	29122	\$12.95

This 175 page *Stamps in Class* text focuses on adding infrared communication and control to your Boe-Bot® robot. You can directly control the Boe-Bot game-controller style, remotely set roaming speed and distance, combine remote control and autonomous roaming functions, and remotely select autonomous roaming modes. The final project makes your BASIC

Stamp® 2 microcontroller an IR remote command sequence interpreter for a remotely programmable Boe-Bot.

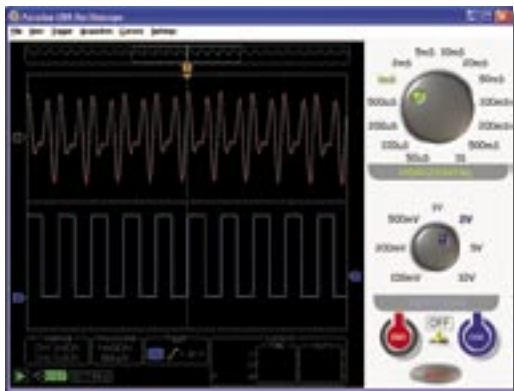
*This text is a continuation of Robotics with the Boe-Bot. To complete the activities, you will need a fully assembled Boe-Bot in addition to this parts kit.*



# FEATURE: New USB Oscilloscope Software

## Improved Software Provides More Data Points

The Parallax USB Oscilloscope is a very popular, portable test and measurement piece of equipment at Parallax. If you are new to this product, download Jack Ganssle's Embedded Systems review from the Parallax web site.



Parallax developed a new version of our USB Oscilloscope software scheduled for a January 2006 release. The new software is compatible with all versions of the Parallax USB Oscilloscope. The new software has been redesigned in Delphi, providing a new architecture with a 25% increase in data point frequency plotting. The improved plotting ability is more fluid and responsive with improved user controls.

The screen capture shows a mixed BASIC Stamp FREQOUT signal of 2000 and 3000 Hz, with a 1 kHz square wave from the Professional Development Board's built-in Pulse Generator.

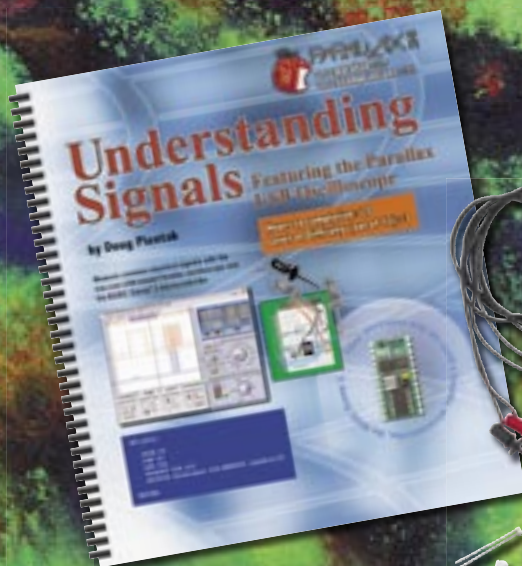


NAME	STOCK Nº	PRICE
PARALLAX USB OSCILLOSCOPE	28014	\$129.00

The oscilloscope hardware connects to your PC via the included USB cable. The hardware is small, portable, elegant and requires no power supply. The case is powder-coated aluminum.

All oscilloscope controls are managed through a point-and-click PC interface. The software provides an easy method of obtaining quality screen captures for reports and live demonstrations. You will have the

ability to measure acquired waveforms with easy-to-use cursors. Common scope features including trigger settings, waveform measurements (MIN, MAX, frequency, period), ability to save customized setups, and BMP screen captures are standard in the software. Special features include 3 cursor functions with the option to snap to the waveform. The cursors operate in zoom mode, allowing close viewing and precise measuring of signals.



## Understanding Signals

The *Understanding Signals* Student Guide is an excellent kit to accompany the **Robotics with the Boe-Bot** and **What's a Microcontroller?** texts and may be completed concurrently or alone. A cost effective approach to learning about electrical signals readings with a USB digital oscilloscope. Running the experiments in this text requires the Parallax USB Oscilloscope (included in #28119) and a Board of Education with a BASIC Stamp 2 or a HomeWork Board (not included).

NAME	STOCK Nº	PRICE
"UNDERSTANDING SIGNALS" PARTS KIT & TEXT	28119	\$149.00

This 144-page Stamps in Class guide shows you how to generate, view and measure a variety of wave forms with the Parallax USB Oscilloscope and BASIC Stamp-controlled circuits. Each activity includes an example circuit and PBASIC code, directions for configuring the oscilloscope and placing the probes, and screen captures of the Parallax USB Software interface displaying the signal.

### Topics include:

- Analog inputs from photoresistors and A/D converters
- RC-time in resistor-capacitor networks
- Asynchronous serial communication between the PC and a BASIC Stamp module
- Synchronous serial communication between a BASIC Stamp and ADC0831 A/D converter
- Single and dual sine waves
- Servo pulse signals over an entire range of motion
- Pulse width modulation with infrared
- Decoding of handheld infrared remote control signals
- Voltage amplification and inversion with DC offset with an op-amp
- BASIC Stamp 2 source code for the experiments in the book are available for download on our website.

The decision to integrate this oscilloscope into our educational program came both from our technicians who used it at their desks, and from educators that ordered several for their classes and requested supporting tutorials. The activities in *Understanding Signals* focus on waveforms common to circuits in other Stamps in Class guides, making this a perfect companion to enhance understanding of other Stamps in Class activities.

# Applied Sensors

NAME	STOCK Nº	PRICE
"APPLIED SENSORS" PARTS KIT & TEXT	28153	\$79.00
"APPLIED SENSORS" PARTS ONLY	28126	\$59.00

*Applied Sensors* was written by Dr. Tracy Allen of Electronically Monitored Ecosystems of Berkeley, California. The 201-page tutorial is the most complete primer on BASIC Stamp program structuring, sensor calibration, and serial communication in the Stamps in Class series. Recently, the text received upgraded schematics, drawings, and source code support for PBASIC 2.5 (as supported in the BASIC Stamp Windows Editor v2.0 (and above)).

The aforementioned concepts are taught using an earth science theme with emphasis on resistor/capacitor networks, serial communication, and data logging. The final *Applied Sensors* experiment (which is a favorite of many customers) consists of an environmental data logger that measures air temperature, water temperature, light levels, and electrical conductivity of water. Two stainless steel screws are used to determine the water level in a cup, and the pump is controlled to maintain the water level. A speaker provides Morse code sound feedback of each sensor parameter as it is logged to the BASIC Stamp module's EEPROM. The BASIC Stamp module's DEBUG command is used to receive all of the data into a PC where it may be pasted into a spreadsheet or other program for analysis.

*Board of Education Full Kit (#28102) is required to use this Stamps in Class text. The HomeWork Board is also fully supported in this text.*

## FIND MORE EDUCATIONAL RESOURCES ONLINE

For more information and for free downloads of Stamps In Class student guides, visit [parallax.com](http://parallax.com). To discuss BASIC Stamps with other educators, get involved in our forums at [forums.parallax.com](http://forums.parallax.com).



NAME	Stock №	PRICE
"PROCESS CONTROL" PARTS AND TEXT	28156	\$59.00

Learn the fundamentals of process control and the underlying electronics and programming principles with BASIC Stamp-based activities. Flowcharting illustrates sequential flow, conditional branching, and looping. Digital input conditioning covers threshold voltage, transistors as switches, the effects of resistor sizing, and typical industrial switches. Experiment with an opto-reflective switch and encoder wheels on a DC fan and learn the practical needs of batch and sequential process control, production logs, counting and edge detection, spurious signals, and high-speed counting. Using the fan with a resistive heater and



temperature sensor, create an incubator system to explore open loop, closed loop, on-off, differential gap, and proportional-integral-derivative control concepts applicable to full-scale industrial systems. Throughout the text, PC-based StampPlot Pro is used interactively to graphically monitor, control, and enhance the experiments. *Note: Process Control, written by Martin Hebel of Southern Illinois University, will replace his earlier book Industrial Control in the Stamps In Class series in early 2006. Please see the #28156 product page at [www.parallax.com](http://www.parallax.com) for information on current availability and kit contents.*

Board of Education Full Kit (#28102) is required to use this Stamps in Class text.



NAME	Stock №	PRICE
"ELEMENTS OF DIGITAL LOGIC" PARTS AND TEXT	28201	\$59.00

The *Elements of Digital Logic* is a hands-on introductory logic course that is relevant for today's student. The course covers the following topics: basic, combinational, sequential logic, problem solving methods and solution design. Along the way, the student is exposed to: simple DC circuit theory, schematic symbols, number systems, simple BASIC Stamp 2 programs. Successful completion of this course gives the student two possible methods of solving real-world problems. The hands-on approach of this tutorial produces a confident student possessing practical problem solving skills. Appendices are provided as reference material so that this book may "stand alone" for individual instruction.

The Board of Education is not required. A BASIC Stamp 2 module (#BS2-IC, not included) is needed for the optional final experiment.

NAME	STOCK Nº	PRICE
"ADVANCED ROBOTICS WITH THE TODDLER" ROBOT KIT	27311	\$249.00

The Toddler® robot is a high quality robot CNC-machined from aluminum and brass. The aluminum parts are brushed, anodized, and acid-etched to make the perfect finish (put the legs on a buffing wheel for a silver shine!). The package includes body parts, legs, ankles, control linkages, screws/nuts/standoffs, etc. Requires 2-3 hours to assemble and tune. The aluminum parts have holes, slots and configurable mounting angles for your own customization. A complete parts listing is available online in the "ROBOTICS" section.

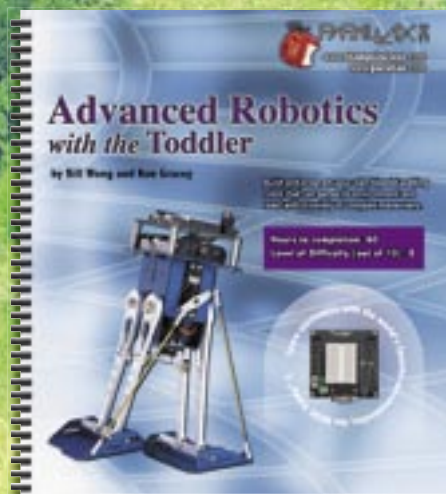
The Toddler robot is controlled by a surface mounted BASIC Stamp® 2 module. Four infrared sensors and receivers, LEDs, servos for tilt and stride, resistors/capacitors, speaker, photoresistors complete the control system. The kit includes the 227-page *Advanced Robotics with the Toddler* student guide.

Walking robots have mechanical and software interdependencies that require in-depth examples and explanation. The *Advanced Robotics* text is an exploration to the Toddler robot's necessary movements. Students using the Toddler robot will learn advanced embedded programming with PBASIC, efficient code development, sensor feedback, and general control. Because of the number of possible movements (34) we consider this an advanced kit appropriate for those aged 14 and above. Previous experience with the Boe-Bot robot (#28132) is helpful although it is not a prerequisite.

NAME	STOCK Nº	PRICE
TODDLER BUMPER SENSORS	27312	\$29.00

These physical sensors provide feedback to the Toddler robot. The pair mounts easily to the Toddler's feet. The *Advanced Robotics with the Toddler* text uses these bumper sensors (also called "Twinkle Toes") for low-lying objects not seen by the infrared sensors.

The kit includes two toes, six pieces of wire so you can experiment making custom bumper designs, mounting hardware and two 12" three-pin servo connectors for an easy interface with the Toddler's BASIC Stamp board.



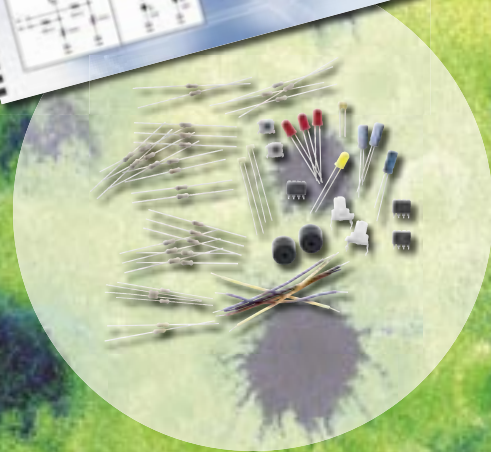
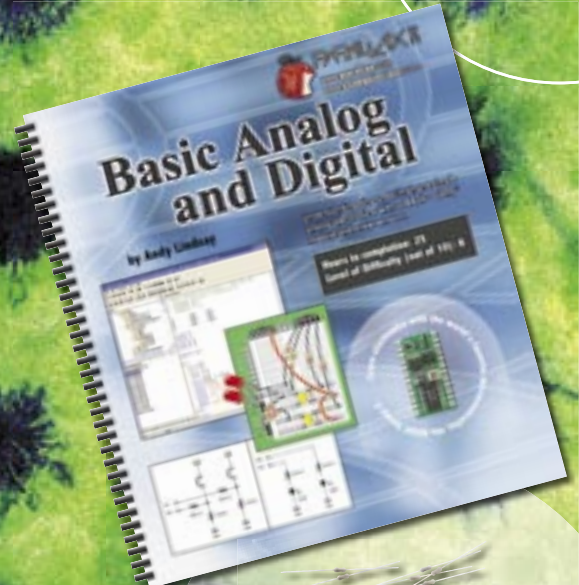
As a former part-time educator, and thus a person very interested in the personal growth of others, through education and practice, please let me offer the following comments.

Rarely do you find a company which establishes an entire division of their business (see the Stamp in Class section of the Parallax web site), purely for the purpose of education in the use of its products and associated disciplines. Along with all of the educational tutorials and other self-learning and teaching materials which are readily available for free download, Parallax also offers formal classes for its customers. They make available for educators those very same class materials they use, to teach their own classes, at no cost to the educational institution.

Parallax has made one very noble, additional step, even beyond all that above, in making many (if not most) of these educational materials available in multiple languages, for worldwide distribution and use. Proper and accurate translations of any technical documents can be a very costly affair; yet, these too are offered for free.

Regardless of your beginning level of expertise in basic electronics, computer programming, device interfacing, electrical and electronics concepts, or any other related field, if you take advantage of what Parallax has to offer, by merely volunteering some of your own time, I can pretty much guarantee you that you'll advance far beyond what you may believe is even possible. The ability to learn from these materials has been proven time and time again by customers from all age groups, from pre-teens to those of senior citizen status.

**Bruce Bates**  
Parallax Customer and  
Forum Contributor

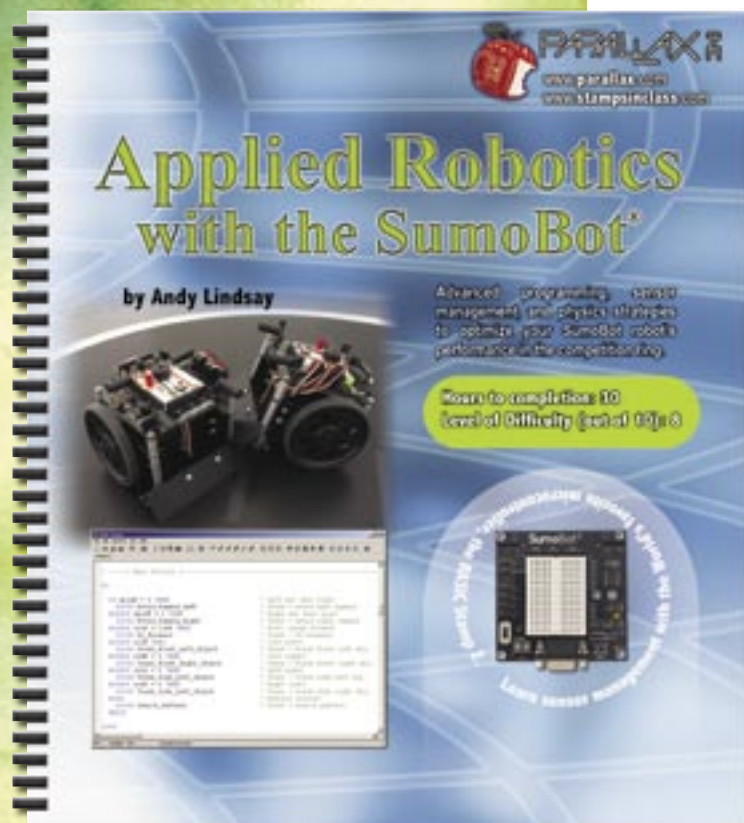


NAME	STOCK №	PRICE
"BASIC ANALOG AND DIGITAL" PARTS AND TEXT	28155	\$45.00

*Basic Analog and Digital* is a 162-page tutorial that covers the essentials of 8-bit A/D and D/A conversion using a BASIC Stamp module. The text introduces PBASIC commands for A/D conversion with resistor/capacitor circuits, interfacing an ADC0831 8-bit A/D converter, scaling analog outputs into meaningful digital values, analyzing time-varying signals, and using PWM as analog output. These concepts are conveyed using potentiometers, LEDs, speakers, photoresistors, and buttons. The text was written by Andy Lindsay of Parallax, and is available for purchase or download.

*Board of Education Full Kit (#28102) is required to use this Stamps in Class text.*

# Our newest Stamp In Class student guide has arrived! Introducing... Applied Robotics with the SumoBot



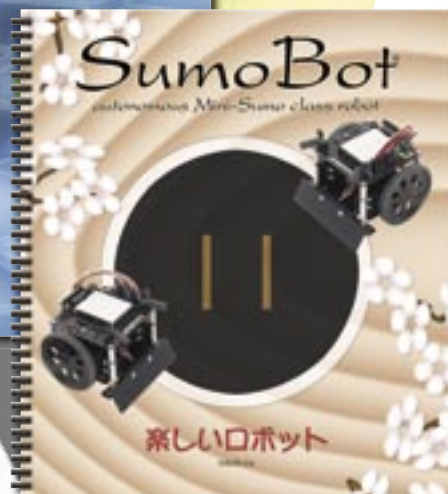
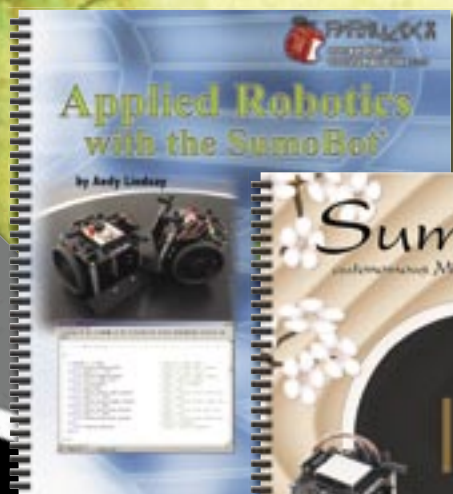
NAME	STOCK №	PRICE
"APPLIED ROBOTICS WITH THE SumoBot" TEXT ONLY	27403	\$29.00

Advanced Robotics with the SumoBot was written specifically for the SumoBot Robot Competition Kit featured on the facing page. This 260-page Stamps In Class text shows you how to test and refine your SumoBot robot's performance in the mini-Sumo wrestling competition ring as you refine your robotics skills.

Activities include friction analysis with free-body diagrams, sensor subsystem testing, self-calibrating sensors, memory optimization with multi-purpose variables and a sensors flag register, and state-machine diagrams for sensor-based navigation. EEPROM data logging lets you record your robot's sensor and program states during a match, then display them afterward in the BASIC Stamp Editor's Debug Terminal – an excellent way to troubleshoot and analyze the performance of your program strategies.

This advanced Stamps In Class text builds on the concepts presented in Robotics with the Boe-Bot, (page 17) which is recommended as a prerequisite or reference, and available for purchase or free download.





SumoBot® Robot  
Competition Ring

Build and program two high-quality SumoBot robots designed to wrestle mini-sumo style! The electronics consists of a surface-mounted BASIC Stamp 2 module and an array of infrared sensors to detect your opponent and the edge of the Sumo Ring. The hardware package includes black anodized aluminum chassis and scoops, servo motors, wheels, 4 AA power packs (batteries not included) mounting standoffs, and screws for two complete SumoBot robots.

This kit includes two printed texts. The *SumoBot Manual* has assembly instructions and test programs that take you from basic moves to one-on-one combat. Once you have your SumoBot robots up and running, give them a competitive edge and expand your skills by following the step-by-step activities in *Applied Robotics with the SumoBot* - an advanced text in our Stamps in Class series (featured on facing page).

Hold your wrestling matches on the durable 36" x 36" SumoBot Robot Competition Ring Poster, designed to use with the instructions and programs included in *Applied Robotics with the SumoBot*.

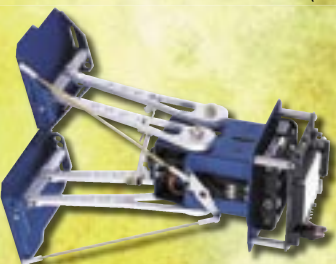
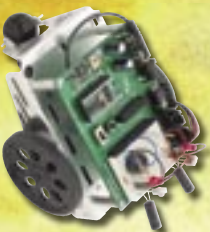
NAME	STOCK	PRICE
SUMO BOT ROBOT COMPETITION KIT	27402	\$199.95
COMPETITION RING POSTER - FOLDED	27404	\$14.95

The SumoBot Robot Competition Kit includes: two SumoBot robots to assemble (including a development board with surface-mounted BASIC Stamp 2); infrared sensors, LEDs, piezospeakers, resistors, and pushbuttons; *SumoBot Manual* with assembly and testing instructions; *Applied Robotics with the SumoBot Stamps in Class* text; serial programming cable; Parallax CD; SumoBot Robot Competition Ring poster; and a screwdriver.

8 AA batteries required, not included. Programming SumoBot robots requires a PC running Windows 98/2000/XP with an available serial port or a USB port with a USB-to-serial adapter.

# Parallax Robot Comparison Chart

Whether you want your robot to roll, walk, or crawl, we've got the bot to suit your needs. And now, "Stamper" as young as eight can enjoy Parallax robots.



Robot	Scribbler™ (Pages 30-31)	Boe-Bot® (Pages 17 and 27)	SumoBot® (Page 25)	Toddler® (Page 22)	QuadCrawler (Page 32)	HexCrawler (Page 32)
Audience	First-time programmers and roboticists ages 8 and up	General robotics and students	Competition robotics and advanced robotics students	Advanced robotics students and mechatronics students	Advanced robot enthusiasts	Advanced robot enthusiasts
Assembly Time	None	1 hour	1 hour	3 hours	11 hours	12 hours
Initial Programming Time	Preprogrammed (and reprogrammable)	40 hours	40 hours	60 hours	20 hours	20 hours
Microcontroller	BS2 OEM (inside case)	BS2 module; accepts any 24-pin BASIC Stamp	Surface-mount BS2	Surface-mount BS2	BS2 module; accepts any 24-pin BASIC Stamp	BS2 module; accepts any 24-pin BASIC Stamp
Features	Fully assembled with Demo Program; reprogram in text or graphics-based programs	Versatile; expandable, and easy to program	For use in autonomous MiniSumo Tournaments or your own matches; bread-board for custom circuits	34 distinct movements challenge you to perfect your programming skills	Versatile 4-legged robot platform (complete programming and customization is up to you)	Versatile 6-legged robot platform (complete programming and customization is up to you)
Reference Book(s)	Scribbler Programming Guides (available as free *.pdf downloads)	Robotics with the Boe-Bot tutorial by Andy Lindsay	SumoBot Manual by Jon Williams and Applied Robotics with the SumoBot tutorial by Andy Lindsay	Advanced Robotics with the Toddler tutorial by Ken Gracey and Bill Wong	QuadCrawler Assembly and Programming Manual by Alex Dirks	HexCrawler Assembly and Programming Manual by Alex Dirks
Capabilities	IR object detection, line following, light following, LEDs, speaker, stall sensor	IR detection, light following, whiskers, servo control, piezospeaker, customizable	IR detection, edge detection, servo control, customizable	IR object detection, light following, edge detection, servo control, customizable	Able to cross diverse terrain, carry a payload, variety of different gait patterns	Able to cross diverse terrain, carry a payload, variety of different gait patterns

# Our best selling Boe-Bot robot!

NAME	STOCK N <sup>o</sup>	PRICE
BOE-BOT ROBOT KIT; SERIAL	28132	\$179.00
BOE-BOT ROBOT KIT; USB	28832	\$179.00

A perfect robot for beginners to experienced roboticists. The Boe-Bot is a Board of Education programming board and BS2-IC module mounted on a chassis with Parallax Continuous Rotation servos and wheels. Hardware, electronics, software, and complete step-by-step manual (Robotics with the Boe-Bot) are included. *For more detailed product information, see page 17.*

## Accessories to make your Boe-Bot robot go even further...

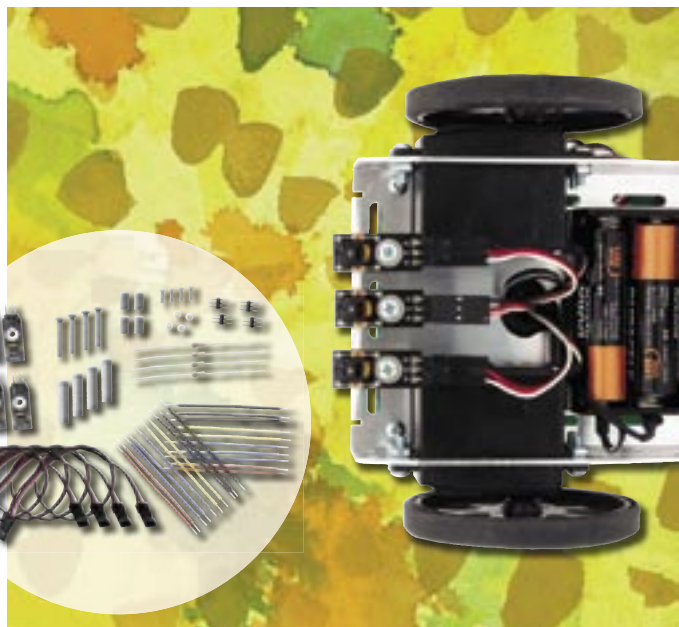
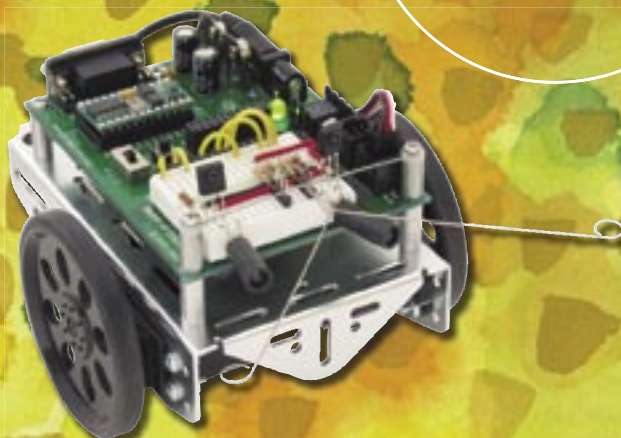
NAME	STOCK N <sup>o</sup>	PRICE
QTI LINE FOLLOWER KIT	28108	\$29.00

This add-on kit uses QTI infrared emitter/receiver modules to easily enhance the line following capability of your Boe-Bot® robot. The QTI sensors mount underneath the front of the Boe-Bot chassis, and can be positioned to adjust to different width lines. The application in this kit uses three QTI sensor/mounting hardware sets, arranged to follow 3/4-inch black electrical tape on white poster board. As a bonus, we have added a fourth sensor/hardware set. Once you master the basics, use all 4 QTI sensors together to make your own custom applications.

NAME	STOCK N <sup>o</sup>	PRICE
BOE-BOT DIGITAL ENCODER KIT	28107	\$39.00

The new Boe-Bot Digital Encoder kit answers a long-standing customer request for position feedback used to improve dead-reckoning, solve mazes, contests and map paths of travel. The infrared reflective sensors mount next to the Boe-Bot robot's wheel to count cycles using the wheel holes. This is an add-on kit for the Boe-Bot Robot Kit (above) which includes the newer wheels required for the Digital Encoders.

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NAME	Stock №	PRICE
Boe-Bot CMUcam AppMod	30051	\$129.00

Track images with the CMUcam AppMod! The Boe-Bot CMUcam ships with printed documentation, CD-ROM with demo programs, and mounting directions. The Boe-Bot CMUcam is designed specifically for the Parallax Boe-Bot robot (sold separately).

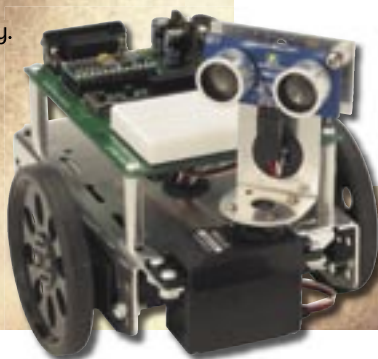
*The board communicates using a TTL level serial port and has the following functionality:*

- Track user defined color blobs at 17 frames per second, find the centroid of the blob
- Gather mean color and variance data
- Arbitrary image windowing
- 80x143 resolution
- 9600 baud serial communication
- Automatically detect a color and drive a servo to track an object
- Slave parallel image processing mode off a single camera bus - advance function
- Ability to control 1 servo or have 1 digital I/O pin - advanced function
- Adjust the camera's image properties - advanced function.

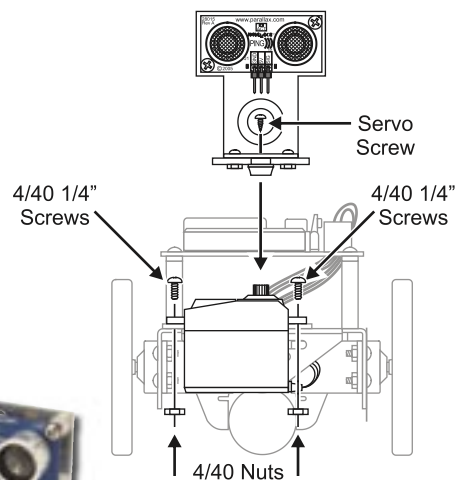
## Mounting the PING)))™ Ultrasonic Sensor on a Boe-Bot Robot for 180° of Scanning Ability

Standard servos have a fairly precise and repeatable positioning ability, which is not the case with continuous rotation servos used to drive the Boe-Bot. By mounting a PING))) on the Boe-Bot, the BASIC Stamp can perform a quick scan of surroundings and determine the path of least resistance with much more accuracy than a static-mounted PING))) on the front of a robot.

The assembly process is quick and easy. The PING))) will be protected from damage by the servo and bracket on the front of the Boe-Bot. The assembled unit is free of loose wires and quite sturdy. **For details and ordering information see page 41.**



Before using the servo screw, adjust the Ping))) bracket to rotate 90° left and right.



NAME	STOCK Nº	PRICE
CRAWLER KIT	30055	\$17.95

Make your Boe-Bot Robot a Crawler by adding this accessory kit. Includes printed documentation with detailed assembly instructions. The Crawler runs on standard Boe-Bot source code and includes one sample PBASIC code in the documentation. To fully capture the way in which the Boe-Bot robot transforms into a Crawler, check out the video (Crawler Kit in Action (.gif)) at the bottom of this page. *The Boe-Bot robot is not included.*



NAME	STOCK Nº	PRICE
TANK TREAD KIT	28106	\$34.95

Turn your Boe-Bot robot into a Tank with this add-on kit from Parallax. Simply remove the wheels from your Boe-Bot robot and attach the gears and tread to give your Boe-Bot robot the ability to traverse unfriendly terrain. *The Boe-Bot robot is sold separately. The parts list includes printed documentation and the following:*

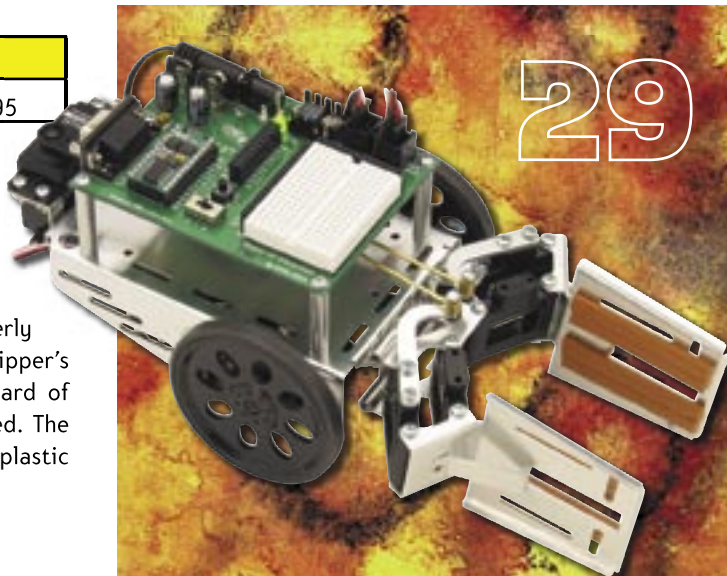
- (6) Machined Panhead screw 4-40, 3/8
- (22) 4/40 Nut, zinc plated machine nut
- (2) 1.5" 4/40 Pan Head screw
- (8) 1/4" 4/40 Screw, Pan Head, Philips
- (8) Screw, Pan Head, Philips, 4-40, 7/8"
- (2) Spacer, Rnd, Alum, #4, 1.25"
- (2) Boe-Bot Tank metal chassis plates
- (1) Tank Wheel and Tread Set



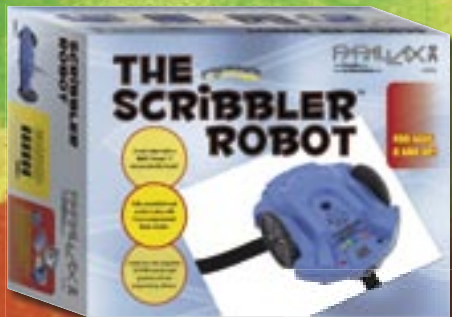
# Get moving...

NAME	STOCK Nº	PRICE
GRIPPER KIT	28202	\$49.95

Do you want to teach your Boe-Bot new tricks, like playing fetch? Our newly redesigned Gripper Kit adds pick-up and carry capability to your Boe-Bot Robot at the right price. The Gripper features parallel plates that open, clamp onto and lift objects all with one cleverly utilized Parallax Standard Servo. Since the Gripper's servo plugs right into a servo port on the Board of Education, no additional battery pack is needed. The lightweight but sturdy aluminum, brass and plastic Gripper hardware weighs less than 7 ounces.



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NEW!



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NAME	STOCK Nº	PRICE
SCRIBBLER ROBOT	28136	\$99.00

Ready to jump into robotics the Parallax way? The new Scribbler Robot is perfect for beginners age 8 and up. The Scribbler is ready to roll right out of the box. Just add batteries, select the program, and watch it go! This reprogrammable robot comes fully assembled including a built-in BASIC Stamp 2 microcontroller brain. It arrives pre-programmed with 8 demo modes, including light seeking, object detection, object avoidance, line following, and more. Place a marker in its Pen Port and the Scribbler draws as it drives. Write your own programs in two formats: graphically with the Scribbler Program Maker GUI software, or as PBASIC text with the BASIC Stamp Editor. Both software packages are included on the Scribbler CD-ROM. Programming guides and more resources may be downloaded from [www.ScribblerRobot.com](http://www.ScribblerRobot.com).

**Programs can interface with these components:**

- 3 photoresistor light sensors
- 2 Infrared object sensors
- 2 Infrared line detection sensors
- 2 independent DC motors
- Stall sensor
- Speaker with full range of notes
- 3 LED indicator lights

**The Scribbler Robot kit includes:**

- Fully assembled Scribbler Robot
- Programming Cable (Serial)
- The Scribbler Robot Start-up Guide
- Software and Documentation CD-ROM

Requires 6 AA batteries, not included. Programming requires a PC running Windows 2000/XP with an available serial port OR a USB port with a USB to Serial Adapter, and a 2-button mouse.

# Programming the Scribbler Robot

The Scribbler Robot has a reprogrammable “brain” – the BASIC Stamp 2 microcontroller. Connect your Scribbler to your personal computer with the serial cable provided. Then, write your own program with your choice of free software. Beginners can program in picture blocks with the Scribbler GUI (Graphical User Interface) programming software. Those familiar with text-based programming can use the BASIC Stamp Editor to write programs in PBASIC. Download your program, disconnect the serial cable, and your Scribbler is ready to carry out its new mission.

## The Scribbler GUI



Learn to program your Scribbler Robot with graphics using the Scribbler Program Maker software and your personal computer. Step-by-step instructions and illustrations make it easy to build programs with mouse-clicks - no experience is necessary.

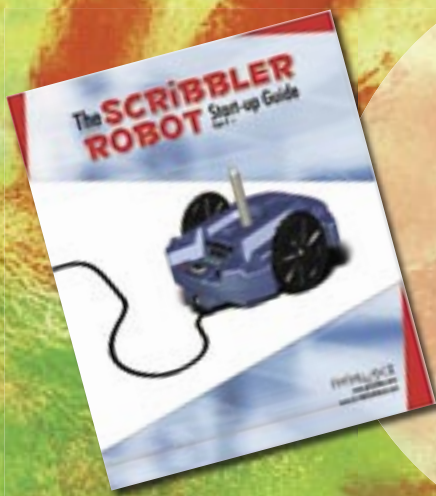
The Scribbler GUI software lets you build your own programs with picture-coded action “blocks” that turn wheels, blink lights, play sounds, and more. Arrange them in the sequence you want, download the program, and your Scribbler robot will perform your routine. When you are done, you can press the Restore button on the tool bar to reload the original Scribbler Demo program.

## The BASIC Stamp Editor



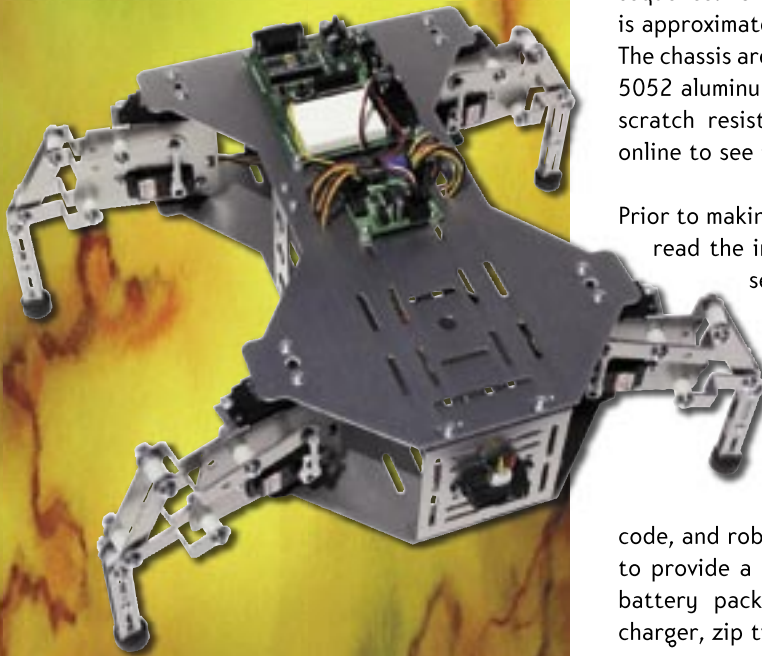
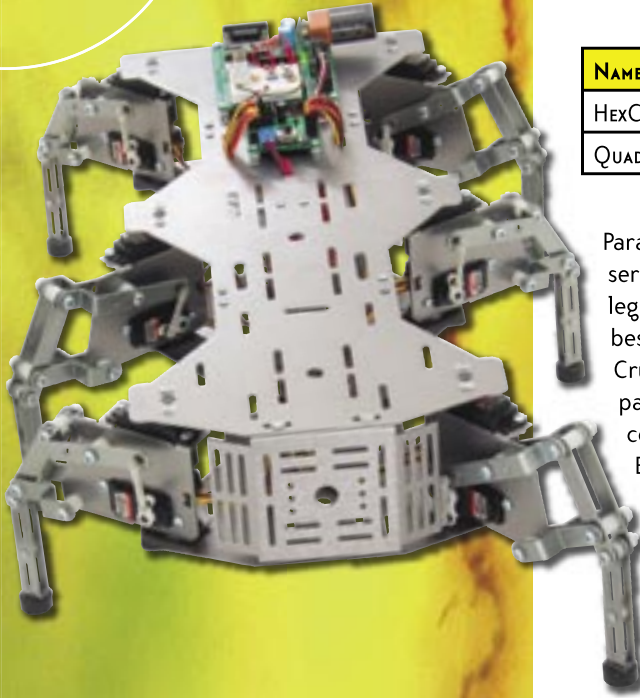
Advanced users who want direct control of the Scribbler’s motors, sensor systems, speaker, and lights have the option of writing programs in PBASIC with the BASIC Stamp Editor. This text editor is used by students, educators, scientists, and engineers to program the BASIC Stamp microcontrollers in their own inventions.

Beginner-friendly Scribbler Programming Guides and sample programs for both the Scribbler Program Maker and the BASIC Stamp Editor platforms are available for free download from [www.ScribblerRobot.com](http://www.ScribblerRobot.com).



**The Scribbler Start-up Guide is a beautiful full-color graphic manual that guides you through the 8 Demo modes already pre-programmed into your Scribbler Robot.**

# Walking in Style: The HexCrawler and the QuadCrawler



NAME	Stock №	PRICE
HEXCRAWLER ROBOT KIT	30063	\$695.00
QUADCRAWLER ROBOT KIT	30073	\$495.00

Parallax partners with CrustCrawler to provide serious roboticists with a winning pair of multiple-legged crawling robots. We focus on designing the best possible control system and electronics while CrustCrawler designs the actual robot and all moving parts. Each robot kit includes the following for the control system: BASIC Stamp 2 microcontroller, Board of Education programming board, Parallax Servo Controller (#28023; page 34), and Hitec Servos. Upper and lower decks are identical on each respective bot offering you several BOE-mounting options.

It's very rewarding to build, program, and watch your "Hex" or "Quad" conquer rough terrain or complete a complicated walking sequence. To give you an idea of the scale, the Quad is approximately 12" in length while the Hex is over 19"! The chassis are made of super rigid yet light .063 Gauge 5052 aluminum with type II anodizing for weather and scratch resistance. Visit our Robotics Video Gallery online to see the action.

Prior to making your purchase, we recommend that you read the individual resource pages in our Robotics section so you're able to understand the complexity of these beasts. It's helpful that you have previous PBASIC programming and circuit-building experience before embarking to this level. Once you have decided to take the leap, you'll be up and running with the printed manual, downloadable source code, and robotics forum. Along the way, you will need to provide a 7.2 V NiMH or 6 cell NiCd rechargeable battery pack, a 9 V battery, AC/DC Digital peak charger, zip ties (optional), and sensors (optional).

*Programming requires a PC running Windows 2000/XP and a serial port or USB port with a USB to serial adapter (#800-00030).*

# PROJECT: Industrial Truck Dumper

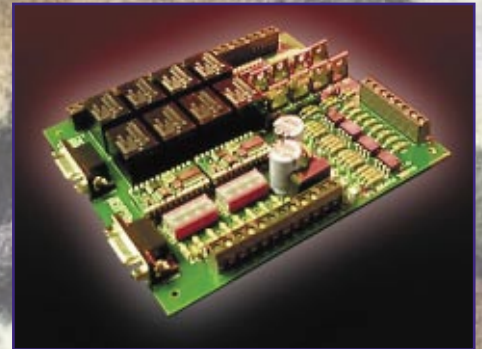
**Sisk Consulting Moves Big Loads with their Stamp-based PLC**

*Tom Sisk reports about his Industrial Truck Dumper project in use at a pulp mill in Eastern Canada:*

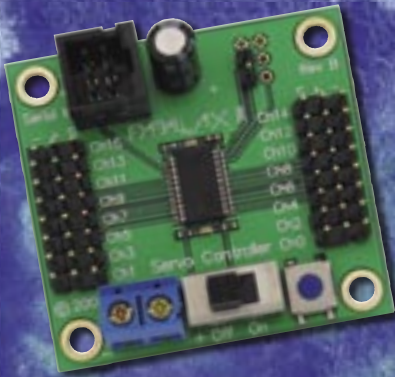
"The BASIC Stamp 2sx performs a critical role in my project. When a driver comes into the booth, he has a load slip that has been generated by the automated truck scales located just out of view to the right. The load slip bar-codes contain his ID number, time of day, the species of wood and whether or not a sample of chips has to be taken from this load. It also confirms that this particular truck should be dumped here and not at one of the other dumpers on the mill site.

Next, the driver scans his load slip and the BASIC Stamp 2sx retrieves the data and prints a form identifying sampling requirements. Then the BASIC Stamp issues a command to the PLC that controls the dumper and the hydraulic system to open the bin floor and start raising the truck. When the truck reaches a certain angle, both trailers empty with a tremendous whoosh. The two-trailer B-train shown brings in about 110,000 lbs of softwood chips in a single load.

The BASIC Stamp circuit board as shown is located in the grey "phone booth" near the back end of truck. It was chosen for this job because of the simplicity of serial interfacing to the barcode scanner and the printer. As well, the circuit board I used gave digital I/O to talk to the PLC and to provide the other control functions needed."



# Parallax Servo Controllers and Servo motors



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NAME	STOCK Nº	PRICE
PARALLAX SERIAL SERVO CONTROLLER	28023	\$39.00
PARALLAX USB SERVO CONTROLLER	28823	\$39.00

The Parallax Servo Controller (PSC) controls up to 16 servos, and may be networked together so that two PSC's can control 32 servos using a single I/O line. The PSC manages all of the servo pulses, which enables any BASIC Stamp or Javelin Stamp microcontroller to take care of more important aspects of your application. Enjoy the many advanced features such as the runtime selectable baud rate (2400 for the BS1, or 38400 for any BS2), servo ramping, and position reporting. Uses a TTL serial interface; a 10" 3-conductor cable is included.

The Parallax USB Servo Controller has all the features of the original, but adds a USB port to receive control signals from the PC. With our free graphical user interface software, a direct link between mouse and servo is made. Move the mouse, the servo moves in real-time. Now the task of developing a program to control intricate servo sequences becomes a palatable fun process. Includes 10" 3-conductor cable and 6' USB A to mini B cable.

NAME	STOCK Nº	PRICE
PARALLAX STANDARD SERVO	900-00005	\$12.00

The Parallax Standard Servo is made exclusively by Futaba. Servos may be controlled directly from a BASIC Stamp I/O pin by using the PULSOUT command. ~180° range of motion; 4.5 - 9.5 VDC.

NAME	STOCK Nº	PRICE
PARALLAX CONTINUOUS ROTATION SERVO	900-00008	\$6.95

The Parallax Continuous Rotation Servo is made for us exclusively by Futaba. It's recommended for robotics projects and includes an adjustable potentiometer port to manually center the servo. Servos may be controlled directly from a BASIC Stamp I/O pin by using the PULSOUT command. The servo is an S148 that has been modified for continuous rotation. 4.5 - 6.5 VDC.

# DC Motor Control

NAME	STOCK Nº	PRICE
MOTOR MIND B	27961	\$29.00

The Motor Mind B provides DC motor speed and directional control up to 30 VDC. Works with a one or two-wire, 2400 baud serial interface. Optional tachometer to read inputs up to 65,528 Hz. The module supports peak currents as large as 3.5 A and continuous currents of 2 A, and has an external emergency override input brake that shuts down the motor. Includes heat sink.

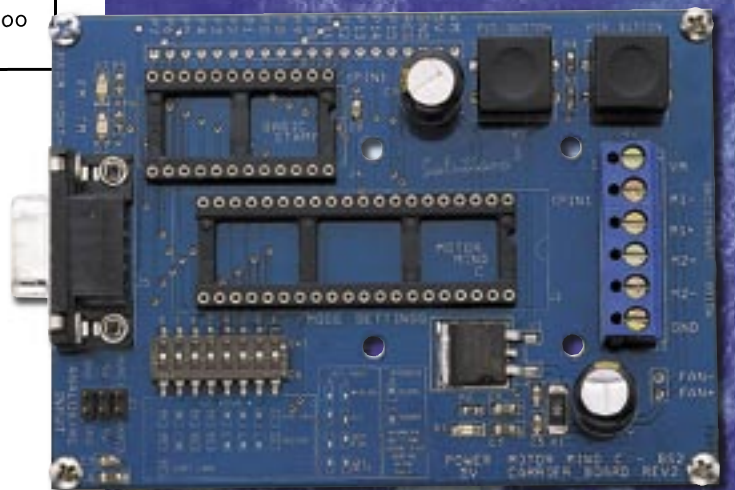


NAME	STOCK Nº	PRICE
MOTOR MIND C	30001	\$55.00

The Solutions Cubed Motor Mind C answers many customer requests for improvements to their popular Motor Mind B. The Motor Mind C has been designed to function as a versatile DC motor control system for controlling one or two motors. The module is ideal for use in small robotics projects for controlling two-wheel axles.

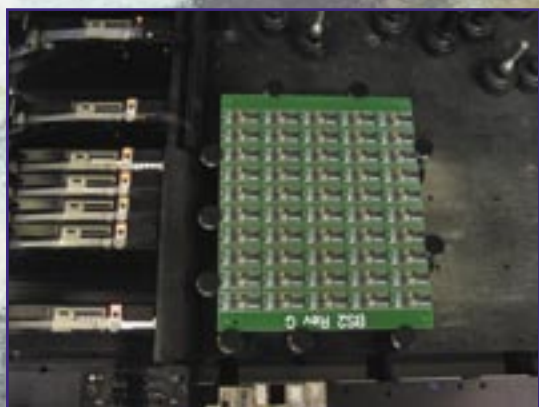
NAME	STOCK Nº	PRICE
MOTOR MIND C BASIC STAMP 2 CARRIER BOARD	30002	\$45.00

The Motor Mind C Carrier Board was designed to simplify connectivity to and ease control of the Motor Mind C. It's the easiest way to implement application notes published by Solutions Cubed using our BASIC Stamp modules. Includes one socket for any 24-pin BASIC Stamp module and one socket for the Motor Mind C.





*Gary applies solder paste to a BASIC Stamp 2 stencil.*



*A panel of BASIC Stamp Modules in the Pick and Place SMT machine.*



*Chip in the FIB room running the E-Prober Machine*

## FEATURE: Manufacturing and Semiconductor Die Analysis at Parallax

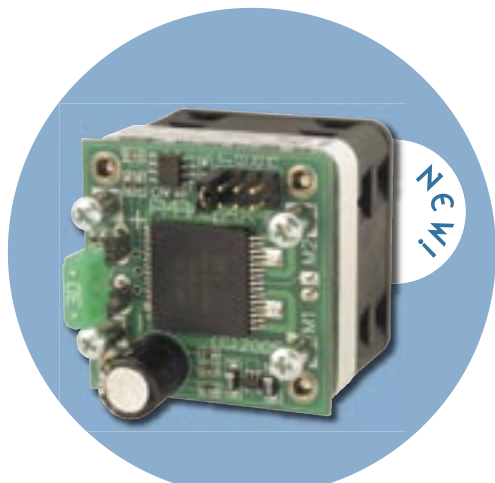
### **BASIC Stamp Modules are Manufactured in our Rocklin Office**

Parallax customers are surprised to learn that all of our BASIC Stamp modules are 100% manufactured in the U.S. There are several reasons for doing this, with the most important being protection of our BASIC Stamp interpreter which has never been programmed outside of our office. Parallax has also developed cost-effective methods to manage BASIC Stamp production with customized tooling, testing and QA/QC procedures. Additionally, lead time is very short when there's no reliance on outside manufacturers.

Parallax Manufacturing Engineer Gary Greenleaf has another valuable skill frequently utilized in our prototype process: hand-assembly of surface mount products.

### **Focused Ion Beam and E-Prober Machines**

In order to customize the Propeller™ (see pages 78-79) die when it returned from the foundry, Parallax built a semiconductor repair room. By purchasing used equipment and repairing it, we now have a functional focused ion beam (FIB) lab and E-beam prober (a non-contact oscilloscope). These two machines saved countless hours when it came to analyzing and repairing the first Propeller dies we received.



NAME	Stock №	PRICE
HB-25 MOTOR CONTROLLER	29144	\$39.95

Parallax's new HB-25 Motor Controller is our single best solution for DC motor control. This product has the following specifications:

Motor Size:	0.5 HP Max – No Minimum
Motor Supply:	6.0vdc min – 16.0vdc max
Logic Supply:	N/A – Internal Regulator
Load Current:	25A Continuous 35A Surge (13.8v)
Standby Current:	50ma@6v 80ma@13.8v (fan on)
PWM Frequency:	9.2 KHz
Pulse Input:	1.0ms Full Reverse, 1.5ms Neutral (Off), 2.0ms Full Forward
Pulse Refresh Rate:	N/A - Single Pulse Operation
Modes:	Single/Dual Motor Control
Protection Circuits:	Over Voltage, Over Current, Over Temp.
Fault Reset:	Automatic
Indicators:	Power (Green), Fault (Red)
Fuse:	Mini ATC Standard
Cooling:	Forced Air – Ball Bearing Fan
Terminals:	Screw Post with 35A Rating
Weight:	2.5oz (71 grams)
Size:	1.6"x1.6"x1.9"
Mounting:	2ea 6-32 screws on .800" centers
Included:	uses (5A, 10A, 15A, 25A), Terminal Lugs (4)

**This product has the additional special features:**

- Single pulse required to set motor speed.
- A single BASIC Stamp port can control two HB-25's.
- On-board fuse and full rating terminal lugs.
- Works with any size motor up to 1/2 HP.
- Contains both H-Bridge and Controller.
- Connector allows you to daisy chain two HB-25's.

## PROJECT: HB-25 Motor Controller

**Machined heat sink, fan and simple software interface drives big motors**

The new HB-25 motor controller created quite a stir in the office. The first prototypes were reported missing before they were found in our tech support area, only to be begged off by another staff member for use in his snow robot design. We attribute the success of this design to the following characteristics:

- Creative thermal design provides efficient heat dissipation.
- Functional mounting approach, with (2) 6-32 tapped holes.
- 12V/25A continuous rating.
- Clean design lacks loose wires and consists of a single part.
- Very simple servo-style pulse interface needs to be set only once.

Controlling the speed and direction of this large motors is just like managing a servo. For example:

```
\ {$STAMP BS2}

Start:
  PULSOUT 12, 850
  \ rotate motor CCW with 1.7 ms pulse
```



NAME	STOCK Nº	PRICE
BI-STEP MOTOR CONTROLLER	30004	\$99.00

The BiStep Motor Controller includes the capability of driving one or two stepper motors, each of which being either unipolar (4-pole) or bipolar (2-pole). This unit is a good choice for those designing products using linear actuators, especially since the microstepping features will reduce noise levels and can increase positional accuracy by a significant amount.



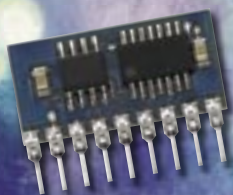
NAME	STOCK Nº	PRICE
LITTLE STEP-U MOTOR CONTROLLER	27938	\$69.00

The Little Step-U Motor Controller is a complete, serially controlled drive system for unipolar stepper motors. Using an intelligent module allows the host system to concentrate on the task at hand while the Little Step-U performs all calculations and operation of the motor. The desired operating speed, ramp time and drive mode can be configured once and then a single command used as required, to move to fixed or relative positions. While the motor is in motion, a BUSY output is active and the movement can be optionally interrupted by one of the two external inputs.



## Control Your Motors...

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NAME	STOCK Nº	PRICE
MICRO DUAL SERIAL MOTOR CONTROLLER	30052	\$23.00

Using one serial output from the BASIC Stamp module, this motor controller can independently set each motor to go forward or backward at any of 127 speeds. To control additional motors, you can connect multiple motor controllers to the same serial line. The Pololu controller supports a low range of voltages and comes pre-assembled. It measures only .9 x .45 inches and is compatible with all BASIC Stamp microcontrollers. In addition to the Pololu controller, you will need a BASIC Stamp module, programming board and motor(s).

NAME	STOCK Nº	PRICE
PWMPAL	28020	\$29.00

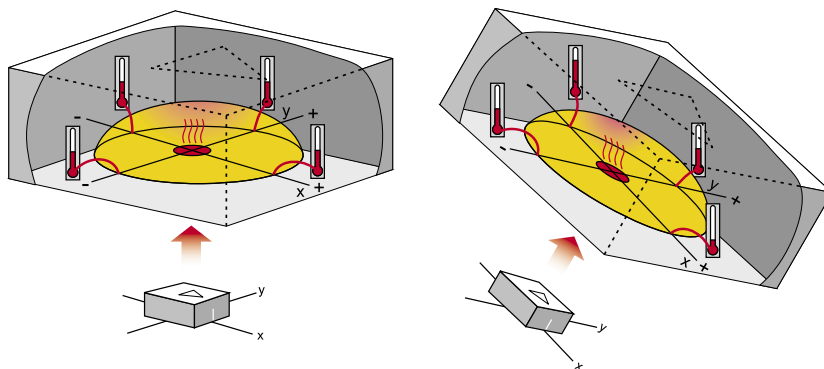
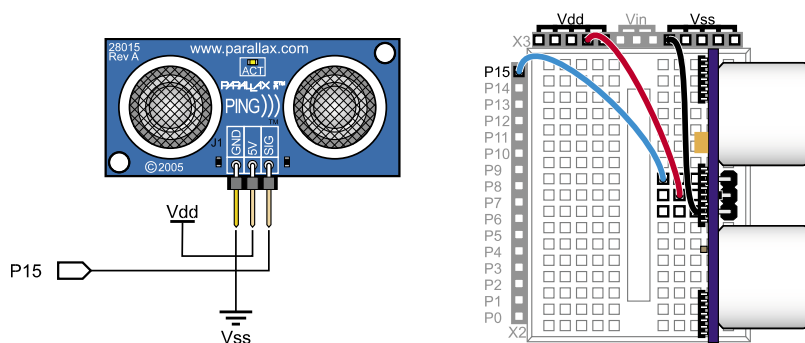
The PWMPAL is an intelligent peripheral that adds up to four PWM output channels and up to four control/counter input channels to the BASIC Stamp microcontroller. A BASIC Stamp module is required to use the PWMPAL and is sold separately.

# PROJECT: New Stamps in Class Text

## Smart Sensors and Applications Book Nears Completion

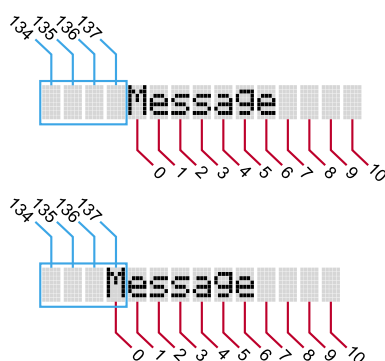
Parallax's Andy Lindsay is nearing completion on his newest Stamps in Class book, entitled *Smart Sensors and Applications*. In this book, Andy collected the popular new Parallax sensors and put them into applications students can use for their own projects. Detailed examples include sonar scanning, G-force data logging with an R/C car, skateboard trick measurement, and compass navigation.

**Detect Distance with the PING))) Ultrasonic Sensor:** Learn to connect the PING))) and write a simple PBASIC program to measure echo time and optimize placement of the PING))) to measure long distances.



**Dual-Axis Memsic 2125 Tilt and Acceleration:** With projects involving skateboards and an R/C car, learn to use the M2125 to measure 360 rotation with the BASIC Stamp's arctangent command and tilt with arcsine, and to understand the difference in the sensor's duty cycle and pulse width outputs.

**Parallax Serial LCD Character Shifting:** In this example you will customize the Parallax Serial LCD to display bargraphs, character scrolls and shifts, and custom characters. Sensors are used in all of the LCD examples to provide hand-held experimentation.



# Look to Parallax for all your **SENSOR** needs.

We now carry a large  
assortment of **BASIC**  
Stamp compatible  
sensors that are perfect  
for your next project.

NAME	STOCK Nº	PRICE
LM34 TEMPERATURE SENSOR	604-00011	\$3.95

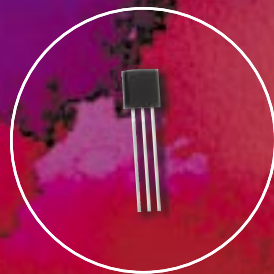
The LM34 Temperature Sensor is efficiently utilized with the ADC0831 A/D converter and well-documented in our *Process Control* text (page 21). Measures +32°F to +212°F with an output of 1 mV/degree F.

NAME	STOCK Nº	PRICE
DS2760 THERMOCOUPLE KIT	28022	\$29.95

Thermocouples provide a low-cost, reliable means of measuring a wide temperature range (32°F to 1873°F or 0° to 1023°C). This cost-effective kit includes three thermocouples, documentation and the DS2760 module.

NAME	STOCK Nº	PRICE
AD592 TEMPERATURE PROBE	28130	\$9.00

Electronic temperature sensor rated is rated: -45°C to +125°C; performance specified: -25°C to +105°C; output is 1 mV/K. This sensor is ideal for submersing in liquid environments. Well documented in our *Applied Sensors* text (page 20).

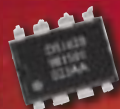


NAME	STOCK Nº	PRICE
SENSIRION TEMPERATURE/ HUMIDITY SENSOR	28018	\$29.00

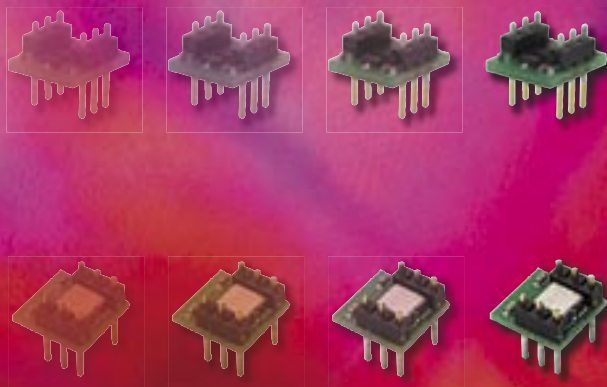
The Sensirion SHT1x addresses humidity measurement issues head-on. A pre-calibrated synchronous serial interface in a tiny package reports relative humidity, and temperature in degrees Celsius.

NAME	STOCK Nº	PRICE
DS1620 DIGITAL THERMOMETER	604-00002	\$6.80

Measures air temperature in units of 0.5°C from -55°C to +125°C, or units of 0.9°F and a range of 67°F to +257°F. Pre-calibrated, synchronous serial interface is very easy to use.



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NAME	Stock Nº	PRICE
PING)))™ ULTRASONIC SENSOR	28015	\$24.95
PING)))™ 5-PACK	28015-5PK	\$99.95

Perfect for any number of applications that require you to perform measurements between moving or stationary objects. The PING))) sensor measures distance using sonar; an ultrasonic pulse is transmitted from the unit and distance-to-target is determined by measuring the time required for the echo return. Robotics applications are popular yet the PING))) would also be useful in security systems or as a replacement for infrared. The PING))) has an activity status LED which makes economic use of just 1 I/O pin. Interfacing to a BASIC Stamp microcontroller is a snap: a single (shared) I/O pin is used to trigger the sensor and “listen” for the echo return pulse.

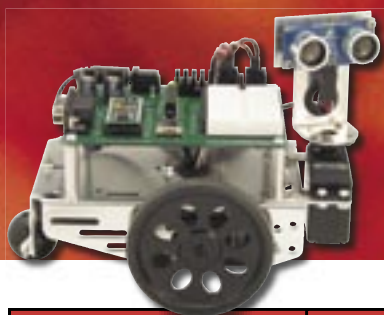


NAME	Stock Nº	PRICE
HITACHI HM55B COMPASS	29123	\$29.95

We placed Hitachi’s surface mount compass sensor chip, a 3 V onboard voltage regulator, and resistor protection in a 0.3” wide 6-pin DIP module. Acquiring measurements from the module is made easy with BASIC Stamp 2 commands SHIFTIN and SHIFTOUT.

NAME	Stock Nº	PRICE
MEMSIC 2125 DUAL-AXIS ACCELEROMETER	28017	\$29.00

The Memsic 2125 is capable of measuring dynamic acceleration (vibration) and static acceleration (gravity) with a range of  $\pm 2$  g.



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NAME	Stock Nº	PRICE
PING)))™ MOUNTING BRACKET KIT FOR THE BOE-BOT ROBOT	570-28015	\$14.95

The Parallax PING))) Mounting Bracket includes the servo, the aluminum brackets and complete hardware to mount a Ping))) on the front of the Boe-Bot (or any robot). By being able to move the Ping))) ultrasonic sensor, your BASIC Stamp can perform a quick 180-degree environmental scan to identify the distance and location of obstacles. With this information you can effectively navigate the path with few obstructions, or hone in on an object you would like follow. For the price of what many companies sell a Futaba S148 servo, we’re providing the complete kit with free technical support.

NAME	STOCK Nº	PRICE
QTI SENSOR	555-27401	\$5.95

This sensor uses a QRD1114 IR sensor to determine the reflectivity of the surface below. Used in the SumoBot robot (page 25) and Boe-Bot Line Follower (page 27).

NAME	STOCK Nº	PRICE
TSL230 LIGHT TO FREQUENCY CONVERTER	27924	\$4.75

The TAOS TSL230 sensor precisely measures light using an array of photodiodes, with an output of digital square waves. The TSL230 has an input dynamic range of 160dB; that is, it can measure light over a range of 100,000,000-to-1.

NAME	STOCK Nº	PRICE
PHOTORESISTOR	350-00009	\$1.95

Useful for robotics and detecting varying degrees of light intensity, a photoresistor simply can't be beat.



NAME	STOCK Nº	PRICE
TCS230 COLOR SENSOR EVALUATION KIT	30054	\$79.00

The TCS230 sensor module set is comprised of a complete color detector, including a TAOS TCS230 RGB sensor chip, white LEDs, collimator lens, AppMod adapter board, and connecting cable. It interfaces easily to any BASIC Stamp module, either through an AppMod socket or connected directly, and can detect and measure a nearly limitless range of visible colors. Applications include color edge-following robots, sorting by color, and color matching, to name just a few. The TCS230 has an array of photodetectors, each with either a red, green, or blue filter, or no filter (clear).

NAME	STOCK Nº	PRICE
M SORTER KIT	30067	\$69.95

The M Sorter Kit includes a servo and materials to build your own M&Ms candy sorter. Additional hardware is required in addition to the M Sorter Kit, such as a BS2, Board of Education carrier board, and TAOS TCS230 Color Sensor. *Limited quantities available.*

# 43



NAME	STOCK Nº	PRICE
FLEXIFORCE SENSOR DEMO KIT	30056	\$25.00

The active sensing area is a .375" diameter circle at the end of the sensor. The conductive leads are easy to connect to a breadboard or through-hole area. The Flexiforce has an ideal output for A/D conversion - 0V is no force and 4.2V is 100 lbs. The RCTIME command may be used with a LOOKUP table or calibration formula to execute some math to make the output useful. Kit includes a 220 ohm resistor, 0.1 uF and 0.01 uF capacitors, Flexiforce sensor, and printed documentation.

NAME	STOCK Nº	PRICE
PIEZO FILM VIBRA TAB	605-00004	\$1.49

This vibration sensor is model LTD0 manufactured by Measurement Specialties. Whether used as a vibration sensor, a flexible switch, or a frequency response device, piezo film is an interesting sensor to interface with BASIC Stamps. Piezo film is used with the COUNT or PULSIN commands on a BASIC Stamp.

NAME	STOCK Nº	PRICE
SHARP GP2D12 ANALOG DISTANCE SENSOR	605-00003	\$11.95

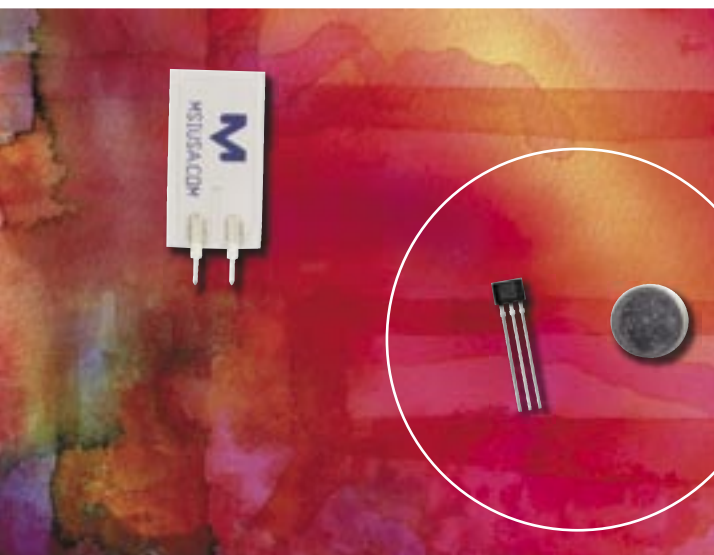
This infrared sensor detects objects within a 10-80 cm range. Interfaces easily using our custom cable (#805-00005; \$2.95) and A/D converter (we like the #ADC0831; \$6.00).

NAME	STOCK Nº	PRICE
QTI13-D TOUCH SENSOR	604-00038	\$3.95

Creates sense fields through dielectric surfaces such as plastic or glass up to 100 mm thick, even turn small objects into sensors. Ideal for simple, inexpensive touch controls. The QTI13 can also be used for material sensing. The devices require only an external sampling capacitor and an electrode (wire) to operate. QTI13 family devices offer auto-calibration, drift compensation, recalibration timeouts, plus a variety of response times, output polarities and toggle modes. These parts need no special calibration or adjustment. They automatically adapt to the build-up of dirt, moisture, and temperature variations.

NAME	STOCK Nº	PRICE
MELEXIS HALL-EFFECT SENSOR	605-00005	\$4.25
3/8" BIAS MAGNET	605-00006	\$0.79

A cost-effective and highly functional hall-effect sensor. The Melexis 90217 is designed to be used with a bias magnet. The single Hall plate this sensor is immune to common rotary alignment problems. The sensor has short circuit protection, gear tooth sensing, A/D converter, high speed operation, zero speed detection, and no chopper delay.



# PROJECT: Parallax Solder Pot Controller

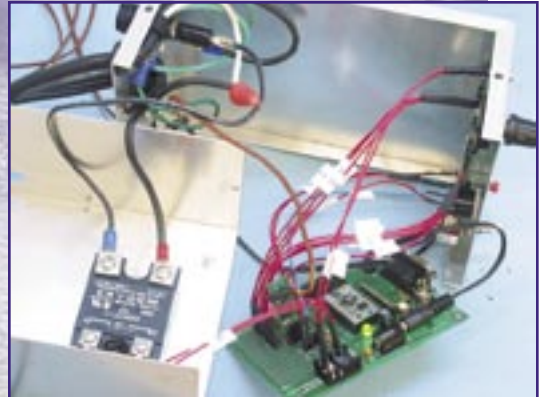
## RoHS Customization Required BASIC Stamp Control

*All Parallax products will be lead-free by early 2006 in order to comply with the European Restriction of Hazardous Substances (RoHS) regulations. All of the BASIC Stamp modules are manufactured in the USA at our Rocklin, California facility.*

Part of the process of manufacturing is to dip the BASIC Stamp legs in a solder pot, which connects them to the PCB's pads. With our chosen lead-free solder (a tin-copper highly eutectic formula) it is important to maintain a consistent solder temperature of 520° F. Additionally, we need to heat the pot quickly in the morning and turn it off in the evening. Built-in temperature controls just don't work – they overshoot and undershoot from the set-point. The combination of temperature, solder type and environment determine the shine on our BASIC Stamp legs, making this an important step in the process.

The challenge for a custom solution was met by our technical support staff. The finished solder pot controller consists of a BS2px24, a 120VAC/50A Crydom Solid State Relay, user interface Buttons, LED Temperature Display and Rotary Encoder enclosed in a metal box. A thermocouple was installed in the side of the solder pot in a stainless steel probe enclosure. The entire BASIC Stamp circuit was built on a BASIC Stamp Super Carrier Board.

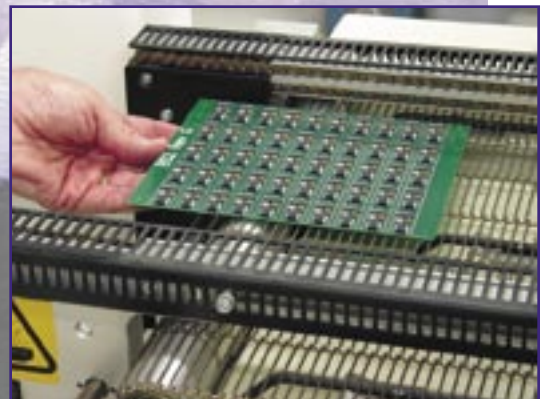
Our manufacturing staff holds the red button and turns the encoder until they reach the desired temperature. Through proportional control the BS2px modulates the temperature to the desired set-point. When it is reached a buzzer sounds so our staff knows the pot is ready to dip BASIC Stamp modules.



Inside the solder pot controller box.



Solder pot is ready for BASIC Stamp modules.



Finished board goes in to the oven.

# PROJECT: Transmitting GPS Position via Iridium Phone

Submitted by F. Sigernes and Jeff Holmes  
University Centre in Svalbard (UNIS), Norway

The rather harsh environment of the arctic requires the UNIS faculty to keep track of their students out in the field. If an emergency situation occurs, the exact location of our students is reported automatically to the logistical department at UNIS. In our typical experiments one of our students is out in the field to sample snow temperatures. Should there be a problem the group needs to act quickly with accurate information for a rescue team.

The core component in the system is a BASIC Stamp 2 microcontroller. Position is extracted from the NMEA sentences of the GPS by the controller and translated to a PDU formatted SMS. The message is submitted to the Iridium phone by using standard AT – commands. The SMS message contains an e-mail address which is gated by the Iridium satellite network to the addressee via internet.

*The entire application including source code and schematics is available for download from the Parallax web site (Resources / Customer Applications).*

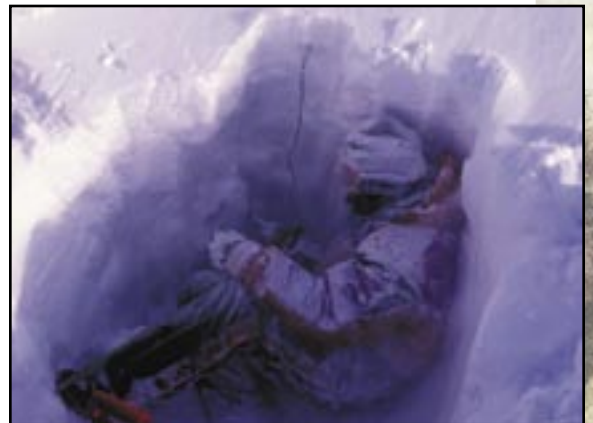
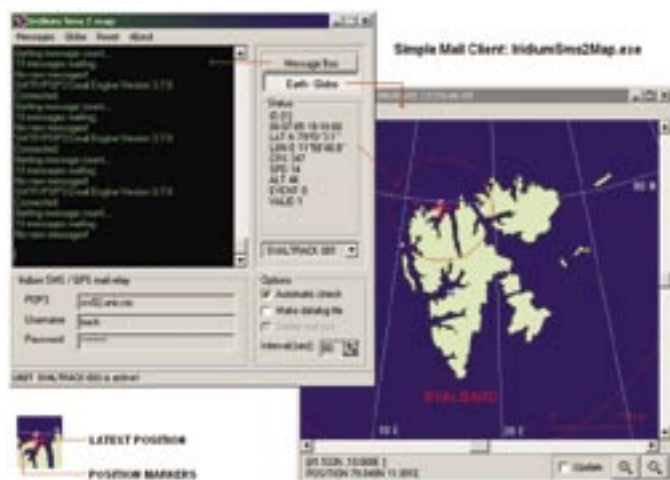


Photo taken by C. Jaedicke



45

# 46



NEW!



THIS  
COMPACT  
2x8 LCD  
PLUGS  
DIRECTLY IN  
TO PARALLAX  
BOARDS!



# Liquid Crystal Displays (LCD)

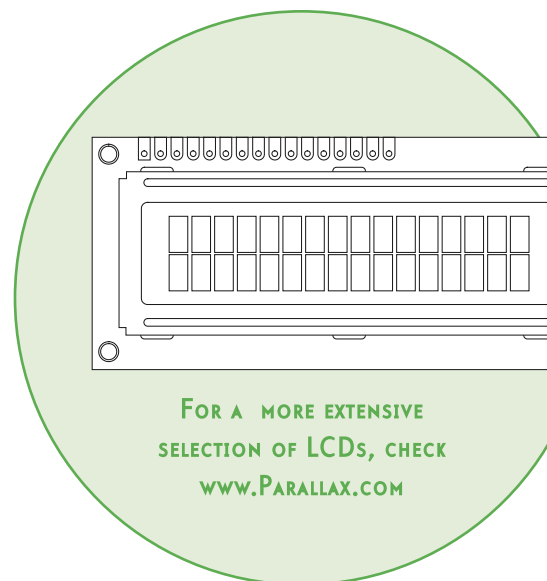
Products are listed clockwise from upper right corner.

NAME	STOCK Nº	PRICE
2X16 SERIAL LCD	27976	\$29.95
2X16 SERIAL LCD - BACKLIT	27977	\$34.95
4X20 SERIAL LCD - BACKLIT	27979	\$39.95

This LCD is available in a backlit and a non-backlit version. The Parallax Serial LCD provides a very functional, low-cost LCD that can be easily controlled by a BASIC Stamp. The LCD display is two lines by 16 characters and provides basic text wrapping so that your text looks right on the display. In addition, the Serial LCD also provides you with full control over all of its advanced LCD features, allowing you to move the cursor anywhere on the display with a single instruction and turn the display on and off in any configuration. It supports the same visible characters as the BASIC Stamp Editor's Debug Terminal (ASCII Dec 32-127). In addition, you may define up to eight of your own custom characters to display anywhere on the LCD. The Parallax 4x20 Serial Backlit LCD features the same character set and command interface as our 2x16 Serial LCD.

NAME	STOCK Nº	PRICE
14" LCD EXTENSION CABLE	805-00002 AND 451-00303	\$1.29

Need a little more reach for your LCD? This 14" long extension cable and 3-pin header for use with Parallax LCDs.



NAME	STOCK Nº	PRICE
120X32 GRAPHIC SERIAL LCD	27936	\$109.00

This LCD can display text in four different sizes, allowing you to format the screen as 4 lines of 20 small characters or 2 lines of 10 large characters, or mix font sizes freely to achieve special effects. The real treat, however, is the graphic capabilities. Plotting points, drawing lines, and displaying full-screen pictures is easy with a 4 KB non-volatile EEPROM. Size is 80 x 36 mm (3.2 x 1.4 in.)

NAME	STOCK Nº	PRICE
LCD TERMINAL APPMOD	29121	\$39.00

This display is excellent for your smaller projects. The module has a 2x8 display, 4 pushbuttons, and will connect to any programming board that has a 2x10 AppMod header (shown below right).

**Compatible programming boards include:** BASIC Stamp Super Carrier Board (page 10), Board of Education (page 10), BS2p24/20 Demo Board (page 10), Toddler Robot Board (page 22), and the SumoBot Robot Board (page 25).





NAME	STOCK №	PRICE
SOUND MODULE APPMOD	29111	\$89.00

The Sound Module is a small recording and playback studio. With an 8KHz bandwidth, both voice and music are handled with good quality. There is a small microphone on board for recording, or you can use the line-in connection for a direct recording. Similarly, the sound produced can be heard using the miniature speaker, or can be directed to the line-out jack. There are 150 message slots, each 0.4 seconds, for a total of 60 seconds of sound. You may use these message slots as one large message, 150 very short messages, or any permutation thereof. These message slots may be recorded and played individually or in contiguous groups using a BASIC Stamp or any other intelligent device capable of RS-232 (TTL level) communication. *BASIC Stamp 2 module and Board of Education carrier board recommended, but not required.*

*Compatible programming boards include: BASIC Stamp Super Carrier Board (page 10), Board of Education (page 10), BS2p24/20 Demo Board (page 10), Toddler Robot Board (page 22), and the SumoBot Robot Board (page 25).*

NAME	STOCK №	PRICE
EMIC TEXT-TO-SPEECH SIP MODULE	30006	\$79.00

This SIP module will let your robot speak, provide a real human-console interface to your control system, or simply provide some entertainment to your BASIC Stamp microcontroller projects. Based on the Winbond WTS701, this device intelligently handles values, sentences, numbers and common abbreviations with an extremely natural female voice with simple serial string sentences. *Features of this module include:*

- Capable of embedded phonetic control for foreign and difficult-to-pronounce words
- Easy-interface SIP format (2.0 x 1.375 inches)
- Single +5V supply with TTL serial interface
- On-board 300mW speaker driver
- ASCII or hexadecimal command sequences
- Bi-color LED for visual feedback of activity
- Audio input pin for amplification of BASIC Stamp-generated sounds and sound effects
- Compatible with BASIC Stamp 2 module and your PC's serial port.
- The pinout is compatible with the QV356 to allow for easy replacement.

NAME	STOCK Nº	PRICE
SPEAKJET DEVELOPMENT BOARD	30074	\$34.00
SPEAKJET CHIP	30075	\$24.99

The Tigerbotics SpeakJet Development Board is a very easy to use development board for the popular SpeakJet Chip (available separately). The board features surface mount construction and is very compact, allowing for a convenient installation in your target application once your speech development is complete. The board features switches and LEDs for directly exercising the SpeakJet chip during development and external connections to all chip functions for remote operation when development is complete. It is easily interfaced to any of our BASIC Stamp 2 microcontrollers.

The SpeakJet is a self-contained, single chip voice and complex sound synthesizer programmed with 72 speech elements (allophones), 43 sound effects, and 12 DTMF tones. It may be controlled directly or by the BASIC Stamp microcontroller using just one I/O pin. The SpeakJet uses a mathematical sound algorithm to control an internal five channel sound synthesizer to generate on-the-fly, unlimited vocabulary speech synthesis and complex sound generation. This is ideal for any project requiring speech.

NAME	STOCK Nº	PRICE
QV306M4P PLAYBACK MODULE	27967	\$79.00

The Quadravox QV306M4P is a small (2.3" x 1.7") PCB that holds an ISD4003-04, an audio amplifier and a serial controller that makes interfacing the device to a BASIC Stamp® microcontroller a snap! The device is pre-programmed with 240 sound files, professionally-recorded numbers, measurements, days and technical terms. Playing any of these "files" is as simple as sending the file number from your BASIC Stamp serially. Volume-control and sleep mode are handled in the same fashion. The device connects to a BASIC Stamp module with power, ground, and serial. Fits nicely within the Board of Education programming board where you can jumper +5V for a power supply. You'll need a speaker (not included). The on-board amplifier can deliver 300 mW so pick up a reasonable speaker from Radio Shack. Otherwise, the QV306M4P works with a BASIC Stamp microcontroller right out of the box (download the Sound Off! examples).



## Parallax and NetBurner Team to Deliver a Quality Internet Device for the BASIC Stamp: the P.I.N.K.

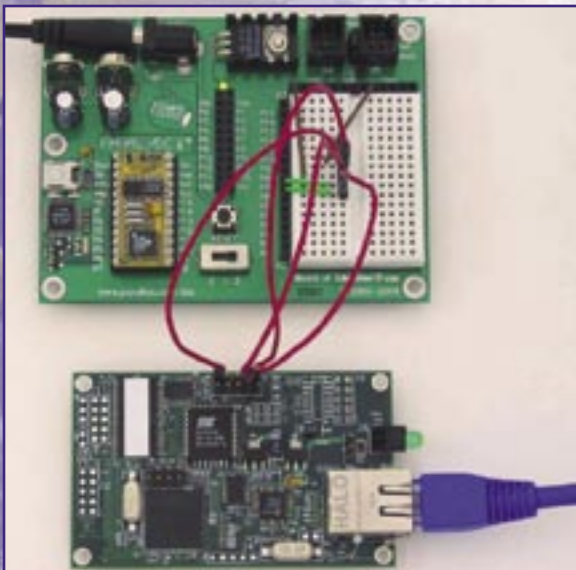
Once you've connected a BASIC Stamp to the internet you can:

- Measure and control your commercial greenhouse environment via a web page
- Manage a robot over the internet
- Send text to speech messages over a remote speaker

To meet this demand from our customers, Parallax teamed up with Netburner, the leader in embedded internet connectivity for microcontrollers. NetBurner and Parallax created the Parallax Internet Netburner Kit (PINK). Using a PINK doesn't require any specialized programming skills. With this device you will use a drag-and-drop FTP interface for file upload. The PINK module will serve the web page and the BASIC Stamp will provide data for insertion in the HTML pages. There's also two-way control with the BASIC Stamp, and Stamp-to-Stamp communication over Ethernet.

### Example Project: Sending Speech Messages over the Internet

With a Parallax Emic Text to Speech Module, a PINK kit and a BASIC Stamp you can send speech messages over the internet. This circuit was developed and deployed in one of our Technical Support staff's cubicles. With this setup, our staff could speak to him by entering the text on a web page. The PINK documentation includes this application.



# New Webserver and E-mail Client

NAME	Stock Nº	PRICE
PINK (PARALLAX INTERNET NETBURNER KIT)	30013	\$139.00

Connect your BASIC Stamp project to the world! Ethernet connectivity provides World Wide Web control to any BASIC Stamp or SX project you can create. The easy drag-and-drop FTP interface for uploading files makes development a breeze. A handy telnet debug server also aids in the development of projects. An easy 4-wire connection is all it takes to put your projects online. Add the connectivity of the internet to the power of your BASIC Stamp microcontroller!

#### Features include:

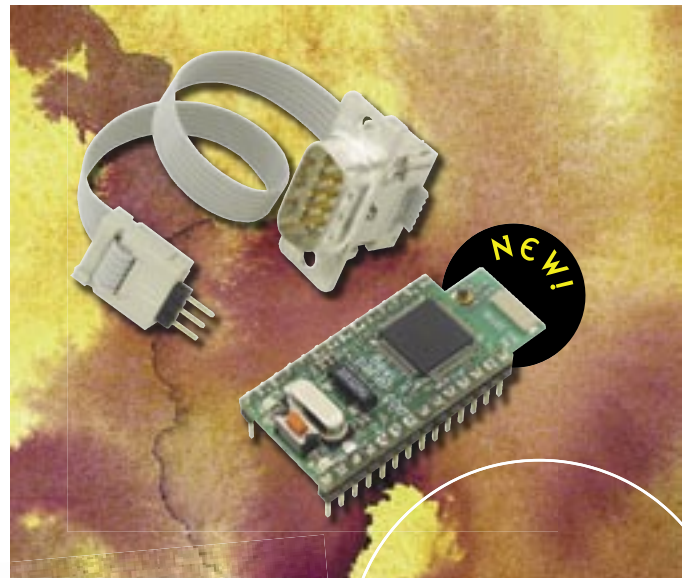
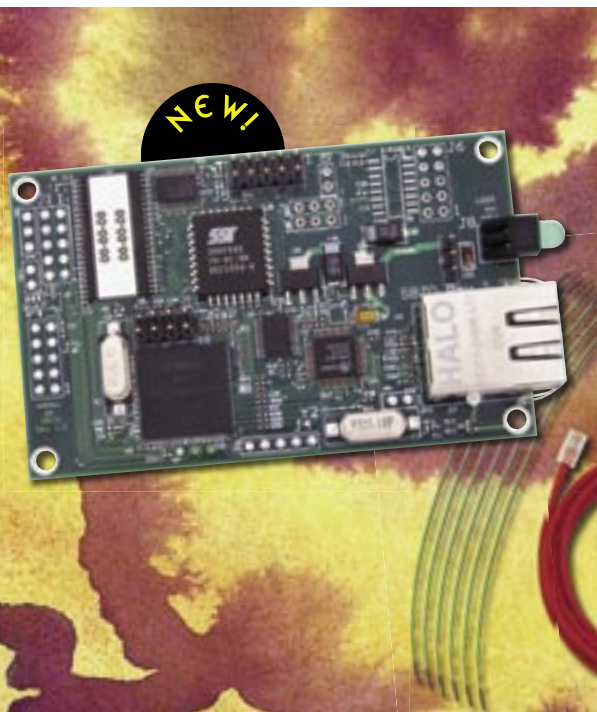
- 10/100-Base T Ethernet connection for BASIC Stamp 2 module or higher
- 256 Kbytes for web files
- Embedded web server (with standard HTML files)
- Telnet debug server
- FTP server, FTP update of web pages and files
- Send and receive UDP packets (Stamp-to-Stamp communication)
- Send email (via SMTP)
- Password protect user selected web pages, files, and configurations
- 100 web accessible variables, allowing for dynamic web pages
- Flash memory for setting default variable values

NAME	Stock Nº	PRICE
TOOTHPICK DEVICE	30076	\$139.95

The Toothpick Stamp Edition is a Stamp-controlled PIC microcontroller with Bluetooth radio, FlexiPanel user interface server and flexible I/O capability. It can also wirelessly in-circuit program the BASIC Stamp from any Bluetooth PC.

The Toothpick Stamp Edition is ideal for data acquisition and remote control applications where the easy learning curve of the BASIC Stamp allows fast time-to-market, while the ToothPIC provides flexibility and sophistication needed in electronic products today.

The module contains all RF circuitry, including integral antenna and controller, and provides a simple-to-use, serial interface to the Stamp. It enables designers to easily add Bluetooth wireless features to their products without the need for RF and antenna design expertise.



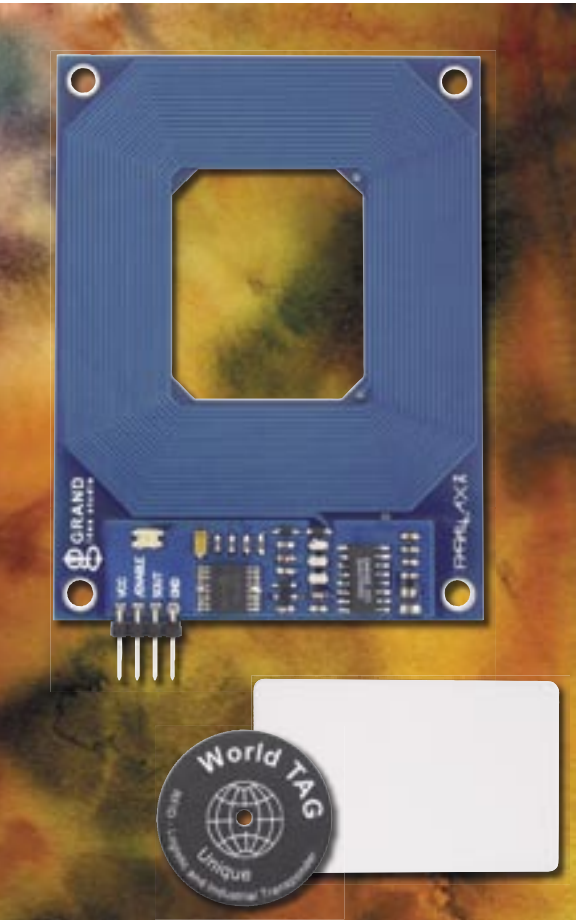
# Parallax RF Modules

NAME	Stock №	PRICE
PARALLAX 433 MHz RF TRANSMITTER	27980	\$29.00
PARALLAX 433 MHz RF RECEIVER	27981	\$39.00

New for 2006! Parallax produces our own RF modules from products made by the wireless module leader, Lynx Technologies. The Parallax RF modules provide a very easy and low-cost method of sending data between microcontrollers or to a PC from 200 to 400 feet away.

PCB Size:	0.85" X 1.85" (without antenna)
Overall Size:	0.55" X 3.5" (with antenna)
Power:	5V +/-10%
Current:	10mA
Data rate:	10,000 bps, or 4800 baud
Frequency:	433Mhz
Transmission:	200-400 feet, based on environmental conditions

Both units have a power down feature and the receiver has a RSSI signal for strength indication.



NAME	Stock №	PRICE
RFID READER	28140	\$39.00
50 MM ROUND TAG	28142	\$2.25
54 X 85 MM RECTANGLE TAG	28141	\$2.25

Designed in cooperation with Grand Idea Studio, the Parallax Radio Frequency Identification (RFID) Reader Module is the first low-cost solution to read passive RFID transponder tags. The RFID Reader Module can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics, navigation, inventory tracking, payment systems, and car immobilization.

- Features include:
- Fully-integrated, low-cost method of reading passive RFID transponder tags
  - 1-Wire®, 2400 baud Serial TTL interface to PC, BASIC Stamp® and other processors
  - Requires single +5 VDC supply
  - Bi-color LED for visual indication of activity
  - 0.100. pin spacing for easy prototyping and integration

These passive RFID tags are designed to work with our RFID Card Reader. Tags may be purchased from Parallax in any quantity.

NAME	Stock Nº	PRICE
MEMKey	27963	\$39.00

Use this Matrix keypad decoder to add user input to your BASIC Stamp. The MEMKey is a programmable keypad encoder which supports both a simple serial communication protocol and the standard PC/AT communication protocol using a matrix keypad as large as 4x5. The MEMKey has 64 bytes of EEPROM and will retain features even with power removed.

NAME	Stock Nº	PRICE
4 x 4 MATRIX KEYPAD	27944	\$19.00
MATRIX KEYPAD CABLE	27943	\$9.00

Recommended keypad for use with the MEMKey. This 4x4 Grayhill keypad has an operational life of 3 million cycles.

NAME	Stock Nº	PRICE
IR BUDDY PAIR	28016	\$49.00

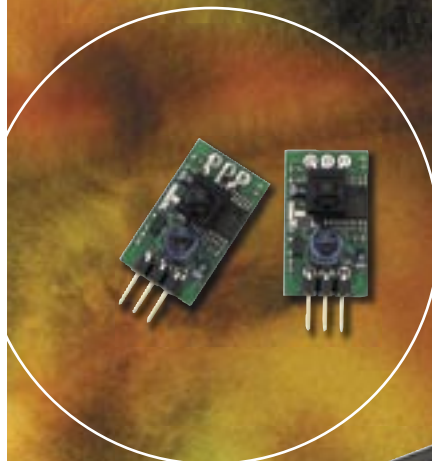
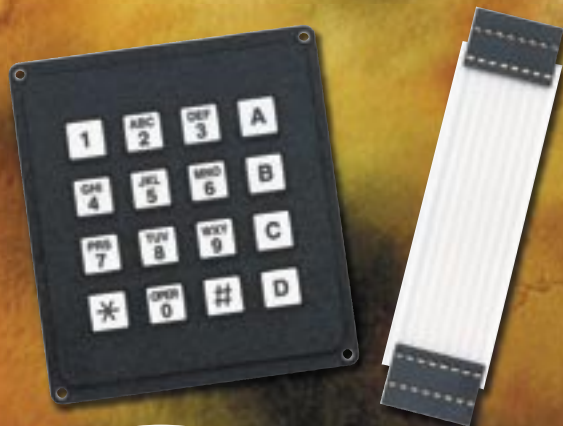
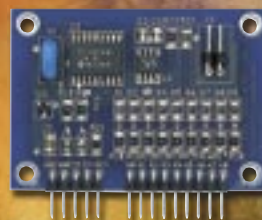
The Infrared Buddy is a handy communication companion for your BASIC Stamp projects. The IR Buddy lets you send and receive data and remote control commands from a single BASIC Stamp pin. The IR Buddy's on-chip 8-byte buffer holds data and remote control commands so your program doesn't have to wait around for them to arrive.

NAME	Stock Nº	PRICE
STACHE FIELD PROGRAMMER	27330	\$99.00

The Stache is a palm-size module for loading up to 15 PBASIC programs into any model of BASIC Stamp 2 Microcontroller under field conditions. Any PBASIC program you write on a PC can be downloaded into the Stache, after which you can transport the Stache to another location and deliver the program to your BASIC Stamp module with a press of a button. The product was created by EME Systems of Berkeley, California. EME Systems has additional technical data on the product at [www.emesystems.com](http://www.emesystems.com), but of course the Stache product is shipped with complete user documentation.

NAME	Stock Nº	PRICE
mBus CAN DEVICE	30011	\$99.95

The mBus CAN Interface provides Controller Area Network (CAN) connectivity for your BASIC Stamp. This microcontroller-based solution relieves the Stamp module of much of the memory and processing requirements needed for CAN communications.





## Bluetooth® technology for the BASIC Stamp

NAME	Stock №	PRICE
EMBEDDEDBLUE EB500 TRANSCIVER APPMOD	30068	\$99.00

The EmbeddedBlue eb500 Transceiver AppMod provides standard Bluetooth connectivity for BASIC Stamp applications without the need for detailed Bluetooth knowledge. Engineers, educators, hobbyists, and OEMs can take advantage of advanced wireless connectivity with this easy to use module. Designed and manufactured by A7 Engineering on specifications provided by Parallax, the exclusive distributor of the EmbeddedBlue Application Module. The documentation includes a detailed overview and sample source code for EmbeddedBlue projects with the BASIC Stamp 2 series, including interfacing to standard Bluetooth devices.

### Technical Specifications include:

- Frequency: 2.4 GHz FHSS (Frequency Hopping Spread Spectrum)
- Transmit Power: 4 dBm (max) class 2 operation
- Open field range: 300 feet
- Bluetooth: Compliant with the v1.1 standard
- Receiver Sensitivity at 0.1% BER: -85 dBm

### Key Features:

- Easy integration with the BASIC Stamp 2 series microcontrollers for point-to-point communication
- Seamless connectivity with standard Bluetooth devices
- Perfect for wireless cable replacement

NAME	Stock №	PRICE
EMBEDDEDBLUE EB600 PC ADAPTER	30069	\$99.00

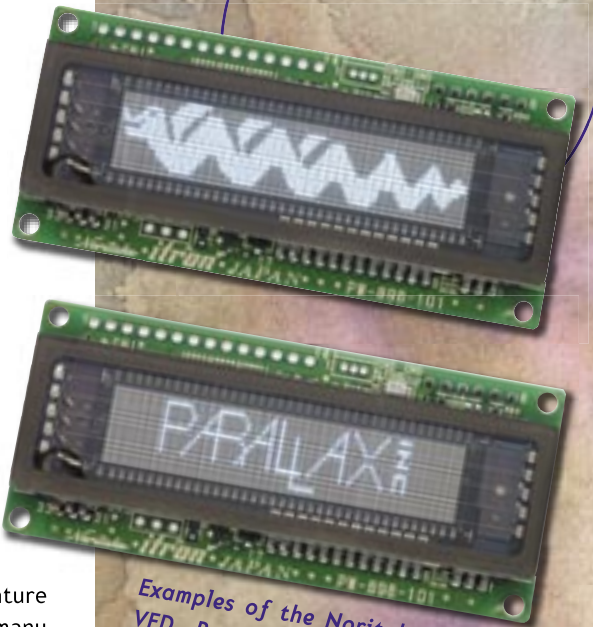
The eb600 PC Adapter in conjunction with an EmbeddedBlue Transceiver AppMod provides Bluetooth connectivity for devices containing an RS-232 serial port without having to know the details of Bluetooth technology. All customers can take advantage of advanced wireless connectivity with this Bluetooth setup. The eb600 PC Adapter hosts a Parallax AppMod header into which an eb500 is inserted. The eb600 PC Adapter connects to a serial port on devices such as Personal Computers, printers, or any device having an RS-232 serial port. The eb500 module provides a point to point connection much like a standard serial cable. Connections are made dynamically and can be established between two eb500 modules or an eb500 module and a standard Bluetooth v1.1 device. Devices can be dynamically discovered and connected in an ad-hoc manner. If, however, the eb600 is attached to a dumb device, such as a printer or terminal, the eb500 will only be able to accept connections, not initiate connections with other Bluetooth devices.

# PROJECT: Graphic VFDs with Serial Interface

112 x 16 Pixel Display of Bitmap Graphics and Text from a BASIC Stamp

The Parallax tech support staff is a productive marketing research division within Parallax. In Fall 2005 they began to experiment with interfacing the Noritake 112 x 16 pixel vacuum fluorescent display (VFD). This Noritake display supports normal text like a character LCD, but also bitmap graphics with a serial interface.

With 11 multi-size built-in fonts and magnification, the type and variety of data you can display is amazing. With an eight-level brightness control, screen saver function, 16 custom characters, and wide temperature operating range of a VFD makes them suitable for many applications. If you're looking for the best display for your project, consider this one. At less than \$55, it's the price a standard Serial LCD was sold for just two years ago.



*Examples of the Noritake 112 x 16 VFD. Parallax will be selling this display in early 2006.*

## PBASIC Command Search

I X W M P B B S E Q D N U O S L N L O O K U P C Z  
O E N J Y U T Y H N T Z F S C R O C P H G Y E H P  
C N L S T L L C O I M Z R G H O T W V L J N U M M  
A I F T H E N S T S F W E E K I U P R T D R J A W  
I M O D N A R B O L O T Q D V V F N C I A R J V N  
F N S E R O U T G U U F O R N E X T T U T P R C S  
J H P B P S T M G P T W U U T S R A I D A E R B P  
W L I U O P E E L S N P T N T U G S M N D Z H H K  
Q Q W G T X R S E R I N U C E A O E E P R O M W P  
A O V E H X V H T H N N A T R P M X J M P D G P L

Find these PBASIC commands in the puzzle above:

BRANCH	END	IF THEN	OUTPUT	RTIME	SHIFTIN
BUTTON	FOR NEXT	INPUT	PAUSE	READ	SHIFTOUT
COUNT	FREQOUT	LET	POT	RETURN	SLEEP
DATA	GET	LOOKDOWN	PULSIN	REVERSE	SOUND
DEBUG	GOSUB	LOOKUP	PULSOUT	RUN	TOGGLE
DTMFOUT	GOTO	LOW	PWM	SERIN	WRITE
EEPROM	HIGH	NAP	RANDOM	SEROUT	XOUT

NAME	STOCK Nº	PRICE
MICROCONTROLLER APPLICATION COOKBOOK VOL 1	28111	\$29.95
MICROCONTROLLER APPLICATION COOKBOOK VOL 2	28112	\$29.95
VOLUMES 1 & 2	28113	\$54.00

Matt Gilliland's *Microcontroller Application Cookbook* Vol. 1 is a wide-ranging collection of 113 interface circuits designed around the BASIC Stamp 2 module. With this book you'll be able to assemble a circuit casserole from a collection of ingredients. Suppose you wanted to automate your greenhouse. The book includes examples of controlling solenoid valves with solid state relays (water distribution), simple DC-motor control with H-bridge circuits (roof vents), linear temperature sensors, humidity sensors and photocells. Cook up an application that waters the plants in the morning, opens the greenhouse vents when it's too hot or humid and powers the microcontroller from solar energy!

Volume 2 builds on the success from the first culinary book with a new collection of 154 interface circuits designed around the BASIC Stamp 2 module. Many of our customers have all of the necessary BASIC Stamp hardware but are hungry for additional project ideas and circuits. Well, Matt has delivered a sequel that won't leave you disappointed!



## Design, build, and program circuits that drive inkjet print cartridges!

NAME	STOCK Nº	PRICE
INKJET APPLICATIONS	70017	\$29.95

Another great book by Matt Gilliland – *Inkjet Applications* will show you how to design and build circuits that drive the HP 51604A inkjet cartridge.

There is no need for the print head to be mounted in a conventional “off the shelf” printer, nor any requirement for connection to a personal computer other than as a development tool for writing your own programs for the microcontrollers. Most any microcontroller can be used, including the BASIC Stamp 2 and Parallax SX microcontrollers.

Typical industrial applications are discussed and examples are shown with complete schematics and source code samples. Circuits include single nozzle firing (continuous lines) and alphanumeric printing capability (three fonts included). Non-typical applications are outlined as well, like “Typer”, and “Paint-Bot” – robots that print text or simple graphics on any flat surface, or they can “shoot” an opponent with ink droplets – up to four inches away! Both robots based on the Parallax Boe-Bot robot (pages 17 & 27).



## Even more BASIC Stamp Applications!

NAME	STOCK Nº	PRICE
NUTS & VOLTS OF BASIC STAMPS VOL. 5	70015	\$14.95
NUTS & VOLTS OF BASIC STAMPS VOL. 6	70019	\$14.95

*Nuts & Volts Magazine is a favorite forum for the electronic hobbyist and BASIC Stamp user. Since 1995, Nuts & Volts Magazine has published 128 "Stamp Applications" columns. With Nuts & Volts' easy-going style, the BASIC Stamp is presented with a series of articles describing PBASIC source code and circuit hints wrapped around a set of real-world applications.*

**Note:** Volumes 1-4 are only available as free downloads from our website or from the Parallax CD-ROM.

We just keep on providing you with more applications! Volume 5 contains the entire collection of Nuts & Volts Stamp Applications columns for 2004. Includes popular columns that highlight topics such as IR distance measuring for Halloween props, remote control with Bluetooth, a drum sequencer, using the Javelin Stamp as the brain for a PLC, and more.

Volume 6 includes articles #117-128, written for 2005. Article topics range from RFID Readers and Ultrasonic Measurement to SX/B and the Professional Development Board. Advanced MIDI receiver, Programming the SX microcontroller in BASIC, mastering the MC14489 display driver, and more!

NAME	STOCK Nº	PRICE
BASIC STAMP MANUAL V2.2	27218	\$24.95

The BASIC Stamp Syntax and Reference Manual is a complete resource for BASIC Stamp microcontroller programming. The detailed PBASIC 1.0, 2.0, and 2.5 syntax support includes example programs demonstrating all commands, including two new commands specifically created for the BS2px.



NAME	STOCK №	PRICE
MICROCONTROLLER PROJECTS USING THE BASIC STAMP	27952	\$44.95

The second edition with a section devoted to the BS2p is a valuable resource for all BASIC Stamp programmers. Due to the range of topics covered, this book is recommended for beginners and advanced users alike. Al Williams' definitive guide will assist you with building your own electronic game, a robot, or an automated manufacturing process. All you need to get started is a PC, BASIC Stamp module, a cable, and programming board. Each chapter includes exercises and source code.

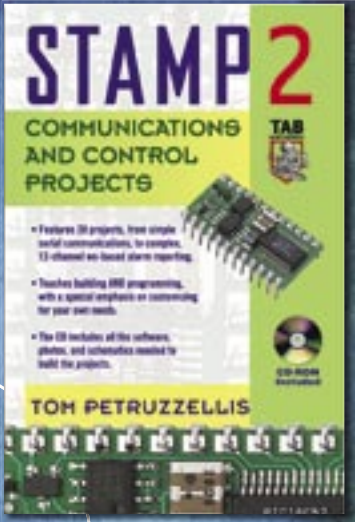
NAME	STOCK №	PRICE
AL'S "WORLD FAMOUS" STAMP PROJECT OF THE MONTH ANTHOLOGY	70013	\$19.95

Since December 1997 BASIC Stamp enthusiast and engineer Al Williams published a "Stamp Project of the Month" column on his web site. These columns were replaced each month with a new one and the archives were maintained by Al Williams off-line. The entire collection of 67 columns is available in the printed book Al's "World Famous" Stamp Project of the Month Anthology.

Al's columns provide detailed examples of BASIC Stamp applications with popular electronic and hardware interfaces. From time to time, Al also featured projects with the SX chip or Javelin Stamp module. Through an agreement with Parallax, Al Williams is making the collection of columns available in this printed book. For many of the columns Al created companion PC/PDA/internet software to communicate with the BASIC Stamp module through the PC's serial port. All of these programs, plus the BASIC Stamp source code files, are available for download at [www.parallax.com](http://www.parallax.com).

NAME	STOCK №	PRICE
STAMP 2 COMMUNICATIONS AND CONTROL PROJECTS	70004	\$24.95

With the help of detailed schematics, informative photos and an insightful CD-ROM (included with the book), Stamp 2 Communications and Control Projects leads you step by step through 24 communications-specific projects. As a result, you'll gain a firm understanding of the BASIC Stamp 2 microcontroller and its programming methodologies- as well as the ability to customize it for your own needs and operating system.



# FEATURE: Penguin™ Robot

## Lessons from a five-year prototype process

By Ken Gracey

Using a simple biped design and building over 25 prototypes, I learned some valuable lessons in machining and durability before I finally decided to finish this project.

My first bipeds were built using a manual mill, band saw, sander and drill. They walked quite well, but required a hard surface to turn. Crashes were dramatic and lots of parts would break. As their size decreased, walking and stability improved dramatically. It wasn't until my small Penguin robots that I was using CNC, giving me another three years of work on the same design.

### Tips I Learned From Working on One Design

*Looking back, I can connect my satisfaction and progress to the following:*

- Using the project to develop specific skills in machining.
- Obtaining help from a key technically-minded friend.
- Focusing on the small steps, but keeping the big goals in mind.
- Planning the work well ahead of making a part.
- Buying the right tools, once. Robotics is a life-long hobby.
- Measuring my improvements against my own work.



### The Final Penguin Design

*The final mechanical design could be described as follows:*

- 3 1/2" tall, and walks about 50% the speed of a Boe-Bot
- Parts machined from 6061 aluminum plate (1/8" and 1/4" thick), anodized or nickel-plated
- Single-piece stride linkage made from 1/4" square Delrin rod
- Micro GWS Naro Servos mounted on 5/8" standoffs, milled flat and drilled/tapped
- Pinned ankle assemblies which hold the leg inside of a 1/4" rod
- Simple 2D design – no 3D machined parts
- 0.001" +/- 0.002" precision, with minimal friction and nice parts fit

### The surface mount electronics include:

- Embedded BASIC Stamp (BS2px) module
- Mini USB-B programming port with FTDI circuit
- (2) infrared emitters and one detector
- (2) photoresistors in R/C circuits
- Mini (0.4" high) blue seven-segment display to assist in PBASIC debugging
- HM55B Hitachi digital compass
- Speaker in the body on the back of the battery pack PCB
- Power supply from two CRI23 3V batteries in series
- Socket for Lynx 433 MHz RF transmitter/receiver or PING)))™ ultrasonic sensor
- Reset pushbutton, power switch, and servo connections



### BUILD YOUR OWN PENGUIN:

*You can download the complete Penguin mechanical drawings, schematic and pictures from <http://www.parallax.com/penguin>. You'll find there's not much room for electronics, so either you'll design a PCB or use the smallest DIP processor you can solder on a through-hole prototype board. If you don't have a lathe and mill, the same mechanical design could be made with acrylic using a band saw, sander and drill/taps.*

# CONTEST: Parallax and Hewlett-Packard

## *Partnership Opens 96 dpi inkjet print technology to the hobbyist and educator*

Almost 26 years ago HP inventor Frank Cloutier led a team which invented the thermal inkjet printing process. Frank's team discovered that by heating their liquid quickly they could persuade it into firing from a nozzle. This discovery led to HP's thermal inkjet process. With HP and Parallax's commitment to education, it seemed natural that we joined together to introduce the scientific and electronic details of HP's print technology to Parallax customers.



### **96 dpi Print Application Design Contest**

Between now and April 2006 you can enter our HP / Parallax Inkjet Design Contest 2006. The prizes include (3) Photosmart 3310 Printers, (3) Photosmart 385 Printers, (3) Photosmart R717 Digital Cameras and (3) Parallax Professional Development Boards (total contest prizes are \$3,500). The contest categories include:

- Non-paper: printing on anything porous
- Mechanical control: new printing applications
- Art: creative uses of inkjet technology

#### **PRIZES INCLUDE:**



**Photosmart 385 Printers**



**Parallax Professional  
Development Boards**



**Photosmart R717  
Digital Cameras**



**Photosmart 3310 Printers**

Eric Ames (HP), Matt Gilliland (Woodglenn Press), Paul Hogue (HP), Ken Gracey (Parallax) and John Lodal (HP) show off some of the prizes to be awarded in the 96 dpi Print Application Design Contest.

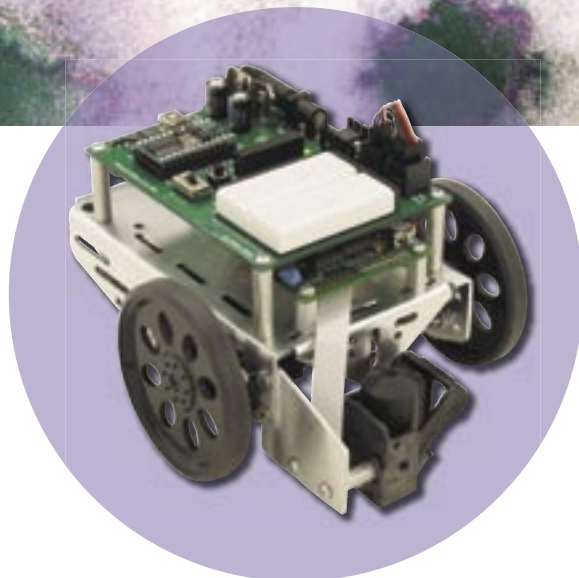


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## Using the Boe-Bot as a Mobile Printer

The best demonstration of the new Parallax Serial Inkjet Printer kit is a Boe-Bot. With its high mobility and popularity, many of our customers already own the printer mechanics! The Serial Inkjet Printer kit includes the bracket to mount the inkjet on the front of the Boe-Bot. The Boe-Bot will roll along, printing 1/8" tall characters and numbers as sent by the BASIC Stamp. Cover your table in butcher paper and let it go.



NAME	STOCK Nº	PRICE
SERIAL INKJET PRINTER KIT	27949	\$99.95

Want to learn about inkjet printer technology, and apply it with a robot or by waving an inkjet nozzle over a piece of paper? Parallax, Hewlett-Packard Specialty Printing Systems and Matt Gilliland have combined to produce this unique kit. The hardware and documentation are designed around HP's Thermal Inkjet 1.0 technology. Using the Parallax Serial Inkjet Printer board, your microcontroller sends a string of serial data which is printed as 1/8" tall characters. Waving the inkjet cartridge over a piece of paper or mounting it on a Boe-Bot produces print-quality text in the font of your choice!

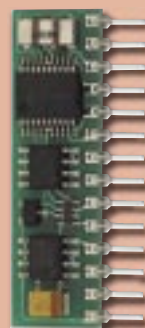
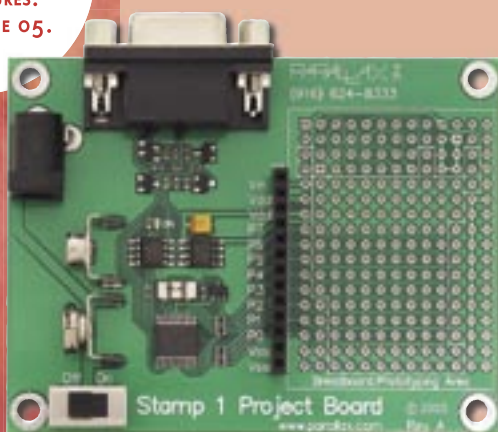
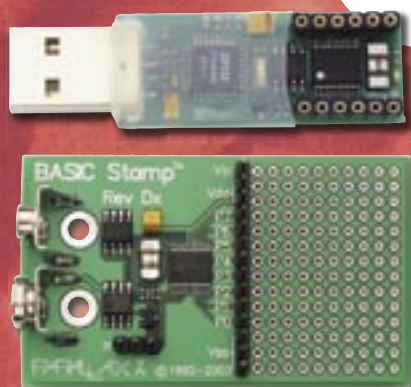
An on-board processor encodes the serial data and commands received into the required properly timed nozzle firing sequences. Additionally, the board holds user-defined characters which may be loaded by BASIC Stamp or USB.

A few components of the kit are also sold separately.

NAME	STOCK Nº	PRICE
SERIAL INKJET PRINTER BOARD	27948	\$49.95
HP51604A BLACK INKJET CARTRIDGE	30014	\$14.95
INKJET APPLICATIONS BOOK (DETAILS PAGE 56)	70017	\$29.95



**BASIC STAMP 1  
MODULES ARE RATED  
FOR INDUSTRIAL  
TEMPERATURES.  
DETAILS PAGE 05.**



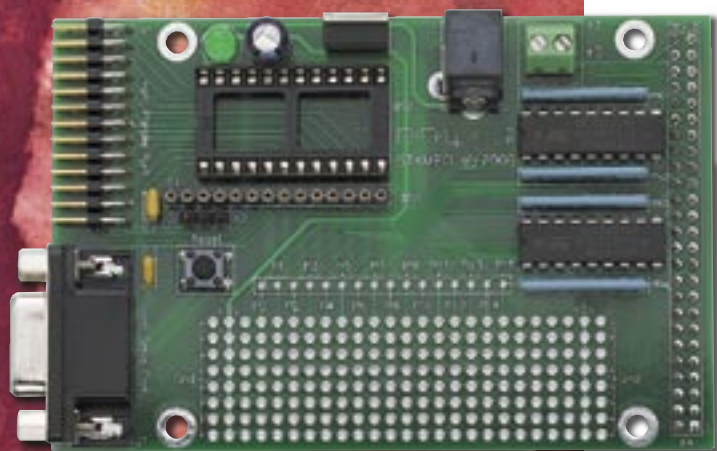
NAME	STOCK Nº	PRICE
BASIC STAMP 2i MODULE	BS2I-IC	\$54.00

This is the industrial version of the BS2-IC and has the same specifications except for the extended temperature range of -40 C to +85 C (-40 F to +185 F). For additional information, please visit the BASIC Stamp 2 module product page.

NAME	STOCK Nº	PRICE
BS1-USB MODULE	BS1USB	\$39.95
BASIC STAMP REV.Dx MODULE	27100	\$34.00
BASIC STAMP 1 PROJECT BOARD	27112	\$29.00
BASIC STAMP 1 MODULE	BS1-IC	\$29.00

NAME	STOCK Nº	PRICE
STAMP CONTROLLER INTERFACE (CI) BOARD	27945	\$69.00

The Stamp Controller Interface allows the BASIC Stamp® microcontroller to connect directly to industrial type digital I/O control boards produced by Opto 22, Grayhill, Allen-Bradley, and others that accept 0-5 VDC voltage control levels. The Stamp Controller Interface accepts all BASIC Stamp modules and has a parallel port connection for monitoring status of I/O pins. A 9-12 VDC, 2.1 mm jack is included for external power supply (sold separately). A clever driver/resistor configuration allows the user to mix and match up to 16 inputs and outputs in any configuration.



NAME	STOCK Nº	PRICE
OPTO 22 8-CHANNEL I/O MODULE RACK	27320	\$59.00
OUTPUT 60 VDC MODULE	27321	\$19.00
OUTPUT 120 VAC MODULE	27322	\$19.00
INPUT 120 VAC MODULE	27323	\$19.00
INPUT 10-32 VDC MODULE	27324	\$19.00

The Stamp Controller Interface (facing page) connects directly to the Opto 22 8-channel I/O mounting rack for an easy high-current switching solution. The Opto 22 I/O board accommodates up to eight I/O modules. Parallax stocks the 60 VDC and 120 VAC output modules, and 10-32 VDC and 120 VAC input modules. The board uses a 5 VDC power supply from the StampCI for control power. The BASIC Stamp® 2 series can take inputs from all 8 relays and power all 8 relays when the Opto 22 rack is used with the Stamp CI Board.

NAME	STOCK Nº	PRICE
STAMP PLC	30064	\$199.00

The Stamp PLC (Program Logic Controller) is sized for automating small machines. Specified by Parallax and designed by Lawicel HB of Sweden, this product represents our combined expertise to answer a frequent request from our customers. A 24-pin BASIC Stamp module or Javelin Stamp module is required (sold separately). Power supply and A/D converter are also sold separately.

PLCs are microcontrollers that are packaged to withstand the hazards of an industrial environment. Stamp PLC inputs and outputs are optically isolated, fully protected, and the electronics are electrically tough and rather immune to noise typically present in industrial environments. Stamp PLC is housed by a strong and sleek enclosure that offers an integral DIN rail mount. Unlike other PLC's which may have proprietary code, you may create the code for your Stamp PLC and customize it to fit your needs. This non-restrictive power will allow you to design and modify your systems much faster. *Technical features include:*

- Safe 24 V industrial control in a DIN rail package
- 10 digital inputs; 8 digital outputs; and 4 analog inputs provides control flexibility
- Front Panel LEDs indicate the status of all ten inputs and all eight outputs via a light-pipe array.
- RS-232 Serial Port to send and received data at any baud rate between 300-50K Baud



# parallax EFX

*Hollywood has many secrets, and not all of them are scandalous tabloid fodder. In fact, one of Hollywood's best-kept secrets is right under your nose. That's right...Parallax.*

Prop masters and special effects technicians have been using Parallax products for years – and if you watched carefully, you may have even seen a BASIC Stamp or two on the big screen, though most of the time Parallax products worked diligently behind the scenes to make the prop or effect a success.

Hollywood can have what it wants, so why use Parallax? For the same reasons that millions of hobbyists and electronics professionals around the world do every day: ease-of-use, dependability, and world-class support that is unmatched by any company in the electronics industry.

In the spring of 2005 Parallax created a new product group: Parallax EFX. The goal of Team EFX is to make the tools used by the pros more accessible to the masses, because props and special effects aren't limited to Hollywood. Home holiday displays, complete with full-fledged animatronic props, are becoming bigger and better every year. Museums, shopping centers, community theaters – all can benefit from the exciting line of Parallax EFX products, and you can too.

*Visit our web site, our dedicated user forums, or give us a call – we're here to help you take your good ideas and turn them into exciting props and displays.*



**www.ParallaxEFX.com**

Have you visited [www.ParallaxEFX.com](http://www.ParallaxEFX.com)? It's the cyber-home of the newest branch of Parallax. This website is the perfect place to check for upcoming events and appearances, get project downloads, and see what new products will be coming out soon from the Parallax EFX team.

We also have a dedicated area of our Discussion Forums just for EFX enthusiasts. Discuss everything from prop design to the best way to program your haunt. Get your questions answered by other customers, even Parallax tech support. **To sign up just point your browser toward <http://forums.parallax.com>.**

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NEW!



NEW!



NAME	STOCK Nº	PRICE
PROP-1 CONTROLLER	31101	\$35.00

The Prop-1 Controller is a single-board solution that is perfectly suited for many prop, display, and animatronic applications. Based on the easily-programmed BASIC Stamp 1 microcontroller, the Prop-1 offers eight I/O pins, with direct TTL (5 VDC) and high-current (up to 500 mA DC) switched outputs. The TTL outputs are available on 3-pin headers that are compatible with devices like hobby servos and serial LCDs. The switched DC outputs are available at terminals that will accommodate up to 14-gauge wire making the connection of devices like solenoids, low-voltage lamps, and small DC motors a snap. The Prop-1 is powered by 9 to 24 VDC and a three position power switch allows the use of this supply at the output terminals, or the option to use a second (isolated supply) to power devices controlled on the switched outputs. The small size of the Prop-1 and mounting holes allow it to be concealed in tight spots and small props.

*Note: To program the Prop-1, you will need a BSI Serial Adapter (#27411; \$4.95; page 05) and Parallax's free BASIC Stamp Editor software.*

NAME	STOCK Nº	PRICE
PROP-1 TRAINER	31199	\$19.95

Whether you're a new or experienced prop builder, the Prop-1 Trainer board is a neat little device that can make your prop programming experience easier. The Prop-1 Trainer board is pre-configured with six LEDs, a push-button trigger input, and a potentiometer (Prop-Pot) circuit, and it simply plugs right on to your Prop-1 controller. Use it to learn about programming or as a local UI for your prop – either way, the Prop-1 Trainer board makes it easy and fun.

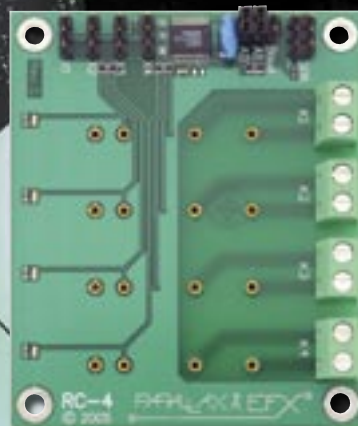
NAME	STOCK Nº	PRICE
PROP-POT	31198	\$4.95

Would you like to add an analog input to your favorite prop; perhaps a timing adjustment without having to update or rewrite your code? Well, then, the Prop-Pot is just what you're looking for. By taking advantage of the BSI's POT instruction, or the RCTIME instruction used by the BS2-family controllers, the Prop-Pot can be programmed to serve as an adjustment dial for your prop – a real-time input that lets you adjust the timing (or another variable aspect) of your project quickly, precisely, and with ease.

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NEW!

NEW!



NAME	Stock Nº	PRICE
AP-8 (AUDIO PLAY 8) BOARD	31308	\$49.95

The AP-8 gives your prop/display quality audio in a compact form. With the AP-8 you can record and play-back up to 60 seconds of audio, dividing it into up to eight segments if needed. Play-back can be manually started with an onboard pushbutton, or remotely through a serial or parallel interface. The AP-8 simplifies prop building by including a dual-level amplifier and volume control – all you do is add an 8-ohm speaker and your prop is ready to sound off.

NAME	Stock Nº	PRICE
RC-4 RELAY BOARD	31204	\$19.95

Extend your prop control beyond basic digital/DC circuitry with the RC-4. You can control up to four AC circuits via serial or direct (dry contact) input. The RC-4 uses solid-state relays (sold separately) to eliminate the problems induced by mechanical relays (contact arcing, radiated noise, etc.). Small yet bright LEDs indicate which loads are hot, and under serial control the host processor can control up to four RC-4 boards (16 AC outputs) on a single serial line. Large screw terminals accommodate up to #14 gauge wire making the addition of A/C circuits a snap.

NAME	Stock Nº	PRICE
CRYDOM D2W203F SOLID STATE RELAY	400-00010	\$6.95

The Crydom solid-state relay plugs directly into the RC-4 board. These relays can switch 2A @ up to 240 VAC, though it is recommended that you design your system to use 110 VAC for safety margin. Solid State Relays (SSR) are vastly superior to their standard electro-mechanical counterparts, exceeding standard relays in life expectancy and reliability.

NAME	Stock Nº	PRICE
DC-16 BOARD	31216	\$29.95

For more high-current DC outputs, try the DC-16. Through a simple serial link the DC-16 allows the prop programmer to add 16 additional DC outputs to your project, and through its addressability this can be extended to four DC-16 boards (for a total of 64 outputs) on a single serial control line. Switched DC outputs are available at terminals that will accommodate up to 14-gauge wire making the connection of external devices a breeze. Powered by 9-24 VDC and a 3 position power switch, the supply can be used at the V+ terminal, or an optional second (isolated supply) to power devices controlled on the switched outputs.

# Three Stooges Pop-Up Prop

## Parallax EFX Products in Pneumatic Physical Animation

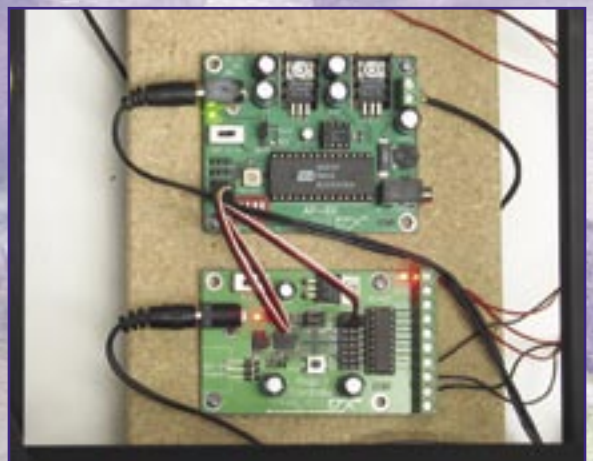
Everyone enjoys a good laugh, including the staff at Parallax and Team EFX. And not many trios incite side-stitching belly laughs like the Three Stooges do. This classic, slapstick comedy troupe has been – and still is being – enjoyed by fans of all ages. The acquisition of a set of Three Stooges dolls begged the question from the EFX team: “What can we do with these?” The answer was almost immediate: Build a popup and articulate the dolls in sync with the group’s famous “Hello, hello, hello... Hello!!!” introduction.

The most complicated aspect of the project is the tri-section pneumatic pop-up, and for that Team EFX turned to master prop builder Brent Ross of Devious Concoctions ([www.deviousconcoctions.com](http://www.deviousconcoctions.com)). Brent built the display using 3/8" welded aluminum and small cylinders that drive the four-bar mechanisms to lift each doll about a foot – with a fair amount of open-loop control for in-between positions.

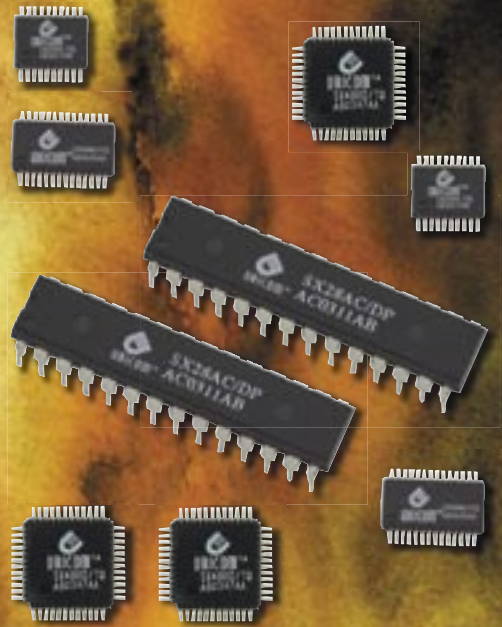
The circuitry for the project is very simple: Upon a suitable trigger input (pushbutton, wireless connection, ultrasonic rangefinder, PIR, etc.) the Prop-1 starts the AP-8 audio player through a digital link and then sequences the pneumatic cylinders (connected directly to solenoid valves) in perfect synchronization with the audio as it's playing.

To handle the audio, Team EFX used a wonderful freeware program called Audacity ([audacity.sourceforge.net](http://audacity.sourceforge.net)). With Audacity the audio was trimmed, downloaded to the AP-8, and sync points established for the PBASIC program that runs in the Prop-1 controller.

*The code and schematic for this project are available for download on the Parallax web site.*



# SX Programming Tools



NAME	Stock N°	PRICE
SX-Key® (REV.F)	552-00007	\$79.00

The SX-Key is Parallax's primary development tool for the SX line of microcontrollers, supporting every chip that is commercially available. Supported by the SX-Key software, the SX-Key programming tool can program SX chips in-system and perform in-circuit source-level debugging. Also at the user's fingertips is an on-board programmable clock. The frequency output of this clock is adjusted from the software with a slider bar between 400 kHz and 100 MHz. The software operates on a Windows platform and is compatible with Win98/NT/2K/XP platforms.

*Rather than alone, we highly recommend purchasing an SX Tech Toolkit (page 70). Our kits include the SX-Key programming tool, SX Tech Demo Board, 2 SX chips, serial cable, and CD-ROM.*

## SX Chips

The Parallax SX is a RISC architecture, high-speed microcontroller with flash program memory, in-system programming and debugging capability. Operating at frequencies up to 75 MHz with an optimized single-cycle instruction set, developers can implement real-time functions as software modules. Common examples include communication interfaces (I<sup>2</sup>C, SPI, UARTs), frequency generation and measurement, PWM, and sigma-delta A/D.

The SX2s on-chip functions include a general-purpose 8-bit timer, an analog comparator, watchdog timer, a power-save mode with wakeup capability, a configurable internal oscillator and high-current outputs.

*Parallax offers the SX in a 20 and 28-pin SSOP, a 28-pin DIP and a 48-pin LQFP.*

PART N°	PINS	I/O	EE/FLASH	RAM
SX20AC/SS	20	12	2K bytes	136 bytes
SX28AC/DP	28	20	2K bytes	136 bytes
SX28AC/SS	28	20	2K bytes	136 bytes
SX48BD	48	36	4k x 12 words	262 bytes

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# Parallax's New Role: Packaging the SX Microcontroller

*Under an agreement made with Ubicom, Parallax is taking full responsibility for the SX's distribution, packaging, test/qualification and support functions immediately. In this role Ubicom will be providing SX wafers to the Parallax semiconductor packaging partners. Parallax accepts this opportunity with enthusiasm and looks forward to growing the SX product line.*

**Parallax SX Part Numbers** - Parallax SX part numbers will stay the same, as shown below.

- SX20AC/SS
- SX28AC/SS
- SX28AC/DP
- SX48BD



## Compliance with the European RoHS Lead-free Requirements

Parallax is continuing the Ubicom qualification program to comply with the European Restriction of Hazardous Substances (RoHS) regulations. All SX chip packages with the exception of the SX52 (which will be discontinued) will be available in RoHS-compliant packaging, as well as the current leaded packaging. Our qualification process will be completed by December 2005, with RoHS-compliant chips being available by January 2006. The conversion towards lead-free is consistent with Parallax's lead-free policy. By the end of 2006 Parallax will only be stocking RoHS-compliant SX chips. *The RoHS-compliant SX chips will have a "U" at the end of the part number:*

- SX20AC/SS-U
- SX28AC/SS-U
- SX28AC/DP-U
- SX48BD-U

## SX Chip Label to Show Parallax Logo

Parallax will change the SX chip label on all packages to reflect the new name "Parallax SX". These changes will take effect in our inventory by December 2005. There is no change to the SX silicon. In addition, Parallax is using a different packaging than used by Ubicom for the SX. As a result, some SX packages may have slightly different dimensions of plastic housing, though the chip's pin-out and pad dimensions will not change. For example, a package could be one tenth of a millimeter taller or shorter. We are very considerate of existing manufacturing processes and will not be introducing a package style which is incompatible with current designs. New datasheets will show these changes, if there are any.



## Parallax SX Stock Levels Have Increased

Parallax SX Stock Levels have already increased. Our current SX in-stock quantities are updated on our web site at <http://www.parallax.com/sx>. Our new inventory goal is to provide on-demand delivery with no lead time for the production-quantity SXs (SX28AC/SS, SX48BD, for example) in 50-75K units. Quantities beyond these levels are available but may have a 10-week lead time. Parallax has already placed orders for processed wafers and approximately 125,000 SX chips. Our increased inventory levels will be reached by December. We anticipate no shortage in the SX supply.

## Future SX Support Plans

*Future SX support will continue to increase. Parallax has actively supported the SX chip since 1997 and will continue to improve this level of support with the following:*

- SX discussion forums (<http://forums.parallax.com>) with a professional and highly active support community
- Low-cost development tools (prototype boards, SX-Key tools, free SX/B BASIC compiler)
- 2006 SX Design Contest with more prize money
- Improved and expanded educational material



**LITE**



**PLUS**



**PRO**

**70**

## SX Tech Toolkits to get you started

The SX-Key is Parallax's primary development tool for the SX line of microcontrollers from Ubicom, supporting every chip that is commercially available. By using the SX-Key software, the SX-Key programming tool can program SX chips in-system and perform in-circuit source-level debugging. Also at the user's fingertips is an on-board programmable clock. The frequency output of this clock is adjusted from the software with a slider bar between 400 kHz and 100 MHz. The software operates on Win98/NT/2K/XP platforms. **We recommend the 7.5 VDC 1 Amp Power Supply (#750-00009; \$10.00) for these kits, sold separately.**

Kit Name	SX Tech Toolkit LITE	SX Tech Toolkit PLUS	SX Tech Toolkit PRO
Stock Code and Price	#45180; \$89.95	#45181; \$99.95	#45182; \$229.95
INCLUDES			
SX-Key Development Tool	✓	✓	✓
SX-Key Manual	✓	✓	✓
Programming the SX Microcontroller Book		✓	✓
SX Tech Board	✓	✓	
Professional Development Board			✓
2 SX chips & resonators	✓	✓	✓
Programming Cable	✓	✓	✓
CD-ROM	✓	✓	✓



Parallax's new SX48/SX52 Proto Boards provide a super low-cost project board. With our free SX/B compiler and a \$9.95 retail price, board will be purchased in quantity for one-off SX48/52 projects. Prior to the SX48/52 Proto Board, programming the SX48/52 was difficult due to its surface-mount only package. Customers would either mount it on an adapter or design a circuit board.

NAME	STOCK N°	PRICE
SX48 PROTO BOARD	45300	\$9.95
SX52 PROTO BOARD	45304	\$9.95

Parallax customers are certain to be astounded by the low price and quality of the SX48/52 Proto Board.

#### Features include:

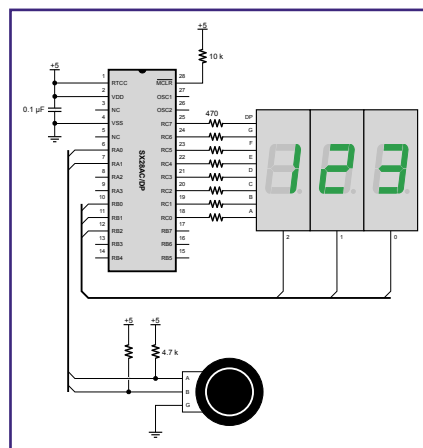
- Surface-mount SX48/52
- LM2940 voltage regulator - input power supply of 6-9 VDC provides up to 1 Amp
- SX-Key programming port with TTL oscillator mechanical interlock prevents both from being used at the same (which damages the SX-Key and TTL oscillator)
- Three-position power switch (off, logic power, power to logic and servo ports)
- Clock configurations supported with additional components sold by Parallax: TTL oscillator (DIP-8 package); ceramic resonator (SIP3 package); Crystal (HC/49 package)
- Smart prototype holes for servo headers, DIP and SOIC8 components

## PROJECT: Quick Projects with an SX28AC/SS Proto Board

In December 2005 we sent the SX28AC/SS Proto Board off to production. Like the SX48 and SX52 Proto Boards, this one will also be priced at less than \$10. With this low cost you could dedicate several of them to projects! Our SX/B on-line help file (part of the SX-Key IDE) includes the following examples:

- 8-bit ADC
- Digital Dice
- Clock/Timer
- Thermometer
- Scanning a 4x4 Keypad
- Serial LCD
- Quadrature Encoder Output
- Dual-axis Accelerometer

Each Help file example includes a schematic and SX/B source code. Comments throughout the code explain the program. All of these projects may be built on the SX28AC/SS Proto Board.



Example of a Quadrature Encoder Input with SX28AC/SS and SX/B



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# SX Boards & Books

NAME	STOCK Nº	PRICE
SX TECH BOARD	45205	\$39.00

The SX Tech board is our project area for the SX microcontroller. Simply plug in the SX-Key, power, and build a project on the breadboard. SX I/O ports and control lines are brought to the SIP headers on the side of the board and accessed by jumper wires.

NAME	STOCK Nº	PRICE
SX52 CON CARNE	45207	\$29.95

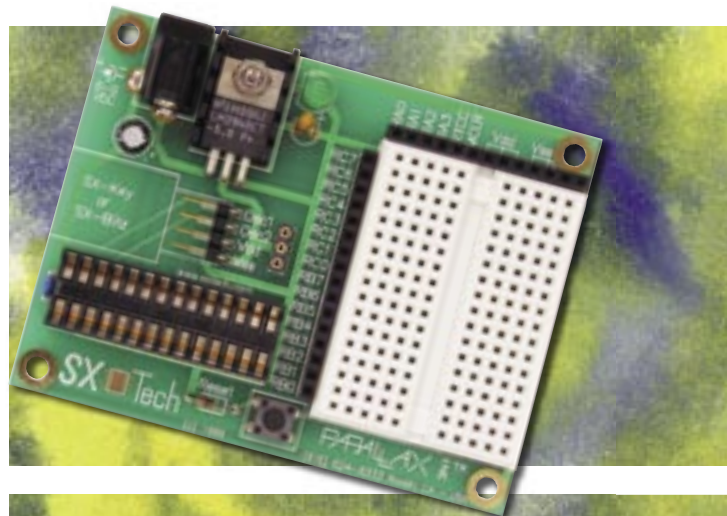
The SX52 con carne provides through-hole solder points for an 8-pin DIP socket, labeled Y2. The Y2 area will accommodate a 300-mil wide, 8-pin socket and a clock-oscillator pack. This could be used as an alternative to a crystal or resonator as the clock source.

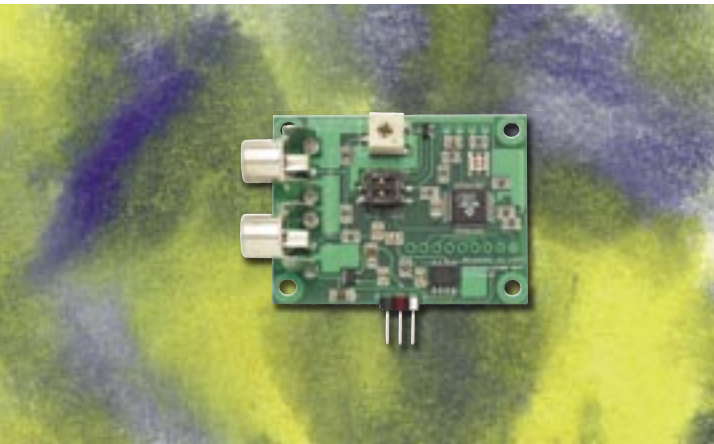
NAME	STOCK Nº	PRICE
SX VIDEO DISPLAY MODULE	30012	\$28.95

The SX Video Display Module is used to create text and low-resolution graphics on a TV or video monitor. Popular uses include simple games, status displays and demonstrations. The video module creates a display of 6 lines each consisting of 16 characters. Each character is 8 pixels wide and 8 pixels high. The module accepts serial data at 4800 baud or 480 characters per second. An entire screen of 96 characters takes only 1/5 of a second. This makes games and rapidly updating display possible.

NAME	STOCK Nº	PRICE
XGameStation	45204	\$279.00

The XGameStation isn't about playing games, it was created so developers could code their own games. Initially this seems like a challenge, but the XGameStation User's Manual (from Nurve Network) develops the different aspects of each game one piece at a time. Similar to Parallax documentation, the XGameStation User's Manual provides explanations, examples and tips to modify the sample code. The examples make use of our free SX/B compiler for the SX28/48/52, along with in-line assembly language. Code is downloaded using the Parallax SX-Key tool and SX-Key IDE.





NAME	STOCK Nº	PRICE
SX VIDEO OSD MODULE	30015	\$49.95

The SX Video OSD Module is used to create text and low resolution graphics “on-top-of” an input video signal. Popular uses include: time/date stamp, security info, status displays and demonstrations. The video module creates a display of 8 lines each consisting of 24 characters per second. Each character is 8 pixels wide and 8 pixels high. The module accepts serial data at 2400 baud or 240 characters per second. An entire screen of 192 characters takes less than 1 second. This makes fairly rapid display updates possible.



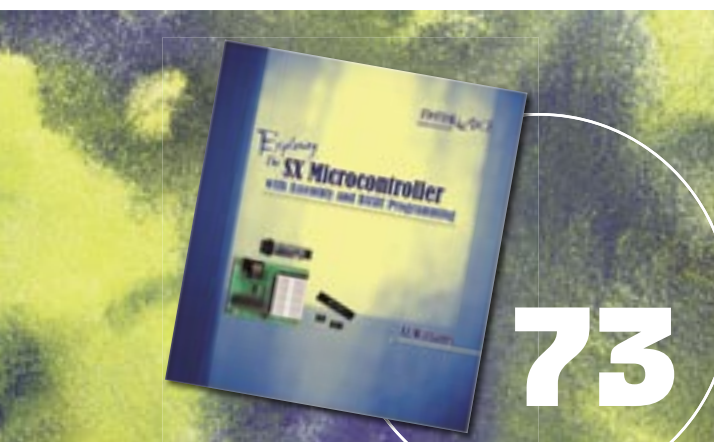
NAME	STOCK Nº	PRICE
SX-KEY DEVELOPMENT SYSTEM MANUAL	45111	\$35.00

The manual is a complete hardware and assembly language reference for the Parallax SX-Key hardware and software. A detailed overview of the intuitive SX-Key IDE explains all features and functions in the software menu system. Explanations of the debugger windows and register management will increase your understanding of the SX architecture. A section of special features of the SX is accompanied with coding tips to take advantage of the precise timing, interrupt capability and port configuration options for edge detection, wake-up and comparators.



NAME	STOCK Nº	PRICE
PROGRAMMING THE SX MICROCONTROLLER: A COMPLETE GUIDE	70002	\$29.95

If you're ready to learn assembly language microcontroller programming, this is the book for you. It not only has a tutorial section for getting started, but also comprehensive reference and application sections you will reach for again and again.



NAME	STOCK Nº	PRICE
EXPLORING THE SX MICROCONTROLLER WITH ASSEMBLY AND BASIC PROGRAMMING	70014	FREE DOWNLOAD ONLY

The first portion of this downloadable book by Al Williams will introduce you to the SX microcontroller's internal architecture as well as show some basic hardware and software concepts. The second half of the book will cover more advanced I/O programming. Topics include number systems, programming and debugging, flow control, math, basic I/O, interrupts, and virtual peripherals.

# FEATURE: SX/B for BASIC Stamp Users

## More Resources for the BASIC Stamp User

Parallax BASIC Stamp customers have requested more printed resources for the SX microcontroller with SX/B. In early 2006 Parallax will announce a new book from Matt Gilliland entitled "Getting Started with SX/B" which is written from a BASIC Stamp user's perspective.

### Excerpts from Matt Gilliland's *Getting Started with SX/B*

"The SX is an incredibly fast and sophisticated microcontroller, which makes it intimidating for those who might wish to "step up" to its capabilities, but have no prior experience with devices like this.

*Getting Started with the SX Microcontroller* is a guidebook that will take you on safari through the jungle of "interpreters", "compilers", and "programming" devices. The book also covers many of the hardware and software tools necessary to give you a solid understanding of the basic functionality of the SX family.

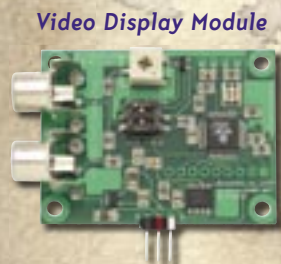
Although no prior microcontroller experience is required, having a moderate grasp of devices such as the BASIC Stamp will help in understanding the capabilities and differences that are inherent to the SX family.

Hardware and code samples are developed for the SX28AC/DP, although with minor modifications any member of the SX family can be used. *Getting Started with the SX Microcontroller* uses an SX/Blitz programming tool to embed code into the device. Demonstration circuits include sensing inputs, control outputs, clock options and more.

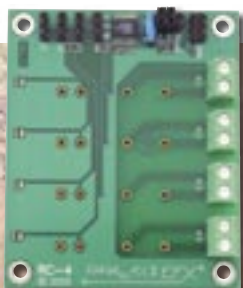
All code samples are written in SX/B, a BASIC style programming language developed especially for the SX. SX/B is a non-optimizing compiler which translates BASIC programs into machine code for subsequent downloading into the microcontroller itself."

### Commercial Products with SX/B

One benefit of using the Parallax SX/B compiler for product design is low unit production costs. Products can be prototyped with a BASIC Stamp and moved to an SX chip for production with some changes to the code and schematics. Several examples of commercial products developed within Parallax used SX/B.



Video Display Module



RC-4 I/O Module



Serial Inkjet Printer



AP-8 Sound Board



STRATIX DEVICE OVERVIEW	EP1S25
LOGIC ELEMENTS	25,660
M512 RAM BLOCKS	224
M4K RAM BLOCKS	138
M512K RAM BLOCKS	2
DSP BLOCKS	10
PLLs	6

The Stratix and Cyclone SmartPacks and FastPack make it easy for you to explore powerful FPGAs from Altera. FPGAs are reconfigurable logic chips which contain many thousands of gates. If you've ever wanted to break beyond the constraints imposed by microcontrollers and make your own systems instead, this is what you need. These FPGA boards are for advanced customers and are not related to the BASIC Stamp microcontroller line of products.

NAME	STOCK Nº	PRICE
STRATIX SMARTPACK WITH EP1S25	60001	\$495.00

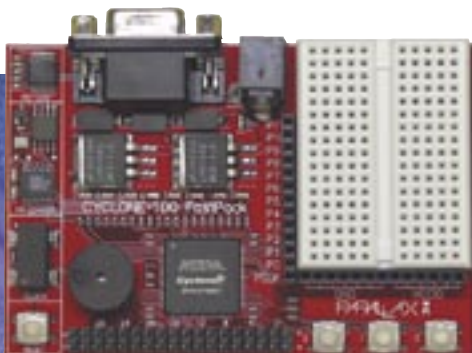
The SmartPack is based on the Stratix chip from Altera. The Stratix has scalable RAMs, DSP blocks, and PLLs, all meshed in an enhanced logic fabric. And it's FAST - built in a 0.13m all-copper process, the RAMs are rated for 300 MHz operation. The PLLs will

step up nominal input frequencies to 400+ MHz. The SmartPack board hosts a Stratix EP1S25 device, power supplies, loader/non-volatile booter, clock, 128 I/Os, filtering for all 6 PLLs, a reset button, and 8 LEDs.

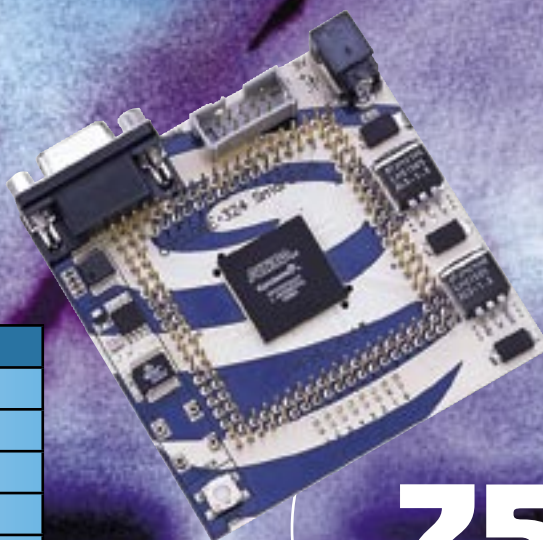
**Note:** The EP1S25 device requires Quartus II Full Edition software from Altera ([www.altera.com](http://www.altera.com)).

NAME	STOCK Nº	PRICE
CYCLONE SMARTPACK WITH EP1C20	60003	\$295.00
CYCLONE FASTPACK WITH EP1C3	60004	\$195.00

The Cyclone is a cost-reduced version of the Stratix. Built in the same technology, the Cyclone is similar to the Stratix, but lacks the 512kb RAMs and DSP blocks. The Cyclone Family may be programmed in AHDL, Verilog, or VHDL.



CYCLONE FPGA OVERVIEW	EP1C20	EP1C3
LOGIC ELEMENTS	20,060	2,910
M4K RAM BLOCKS	64	13
TOTAL RAM BITS	294,912	59,904
PLLs	2	1
MAXIMUM USER I/O PINS	301	104



# USB Control with FTDI and Parallax



## FTDI USB Chip Distribution

Parallax is now a United States distributor for Future Technology Devices International, the leader in USB to serial/parallel interface chips. As USB is replacing serial ports on newer PCs, Parallax chose FTDI as the solution for our Board of Education and USB2SER development tool.

These chips have proven their abilities under multiple operating systems with FTDI's free, top-notch virtual COM port drivers for PCs, Macs, Linux and CE operating systems. The virtual COM port driver interface is just like a serial port with extended data rates. FTDI chips are state-machine based and require no firmware. They can access an optional external EEPROM upon power-up which contains your own USB vendor and product ID should you require this feature. If you are a developer looking for an FTDI or SX chip sample, then visit us online to request free sample development chips.

FTDI chips are LQFP-packaged devices with USB 1.1/2.0 full-speed support

Having chosen FTDI as our USB partner, we decided that our customers would benefit from using these chips in their own projects so we formalized a United States distribution agreement. FTDI's company philosophy is similar to ours: provide an easy-to-use quality product line with complete professional support. Complete pricing is provided online.

**Note:** Stock Numbers with a "G" on the end denote a Lead Free part.

FTDI CHIP	STOCK Nº	DESCRIPTION
FT232BM FT232BL	604-00031 604-00031G	USB TO SERIAL TTL-LEVEL UART UP TO 3 MBIT/s.
FT245BM FT245BL	604-00032 604-00032G	USB TO PARALLEL FIFO UP TO 1 MBYTE/s.
FT2232C	604-00033 60400033G	DUAL-CHANNEL CONFIGURABLE FT232BM OR FT245BM WITH MULTI- PROTOCOL SYNCHRONOUS SERIAL ENGINE (FOR SPI, JTAG, ETC.) WITH DATA RATES UP TO 5.6 MBIT/s.
FT8U245AM	604-00034	FIRST-GENERATION OF THE FT245BM. NOT RECOMMENDED FOR NEW DESIGNS BUT STILL AVAILABLE.
FT8U232AM	604-00037	FIRST-GENERATION OF THE FT232BM. NOT RECOMMENDED FOR NEW DESIGNS BUT STILL AVAILABLE.



NAME	STOCK Nº	PRICE
PARALLAX USB2SER DEVELOPMENT TOOL	28024	\$29.00

The Parallax USB2SER development tool provides a USB to 4-pin serial interface for microcontroller developers. This device is a mini development tool based on the FTDI232BM USB to Serial UART interface chip. We created this development tool in order to provide microcontroller developers (like our BASIC Stamp customers) with easy access to a PC's USB port using the FTDI virtual device drivers. This tool is also a reference design for customer-based applications using the FTDI chip in-circuit.

# NEW: FT232R Single-Chip USB to Serial Converter



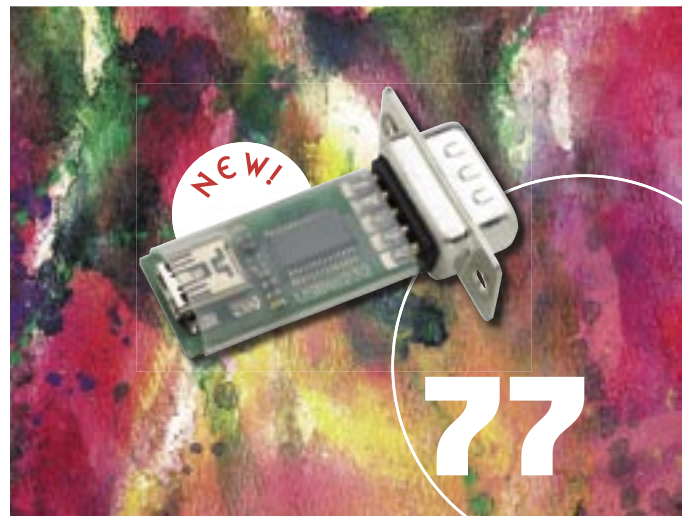
For 2006 FTDI announced their latest USB to serial bridge: the FT232R. These chips incorporate many advancements over the FT232BM and should be used in new designs. Key improvements include an internal EEPROM, reduced external component count, internal clock and compatibility with existing software drivers.

## Other features:

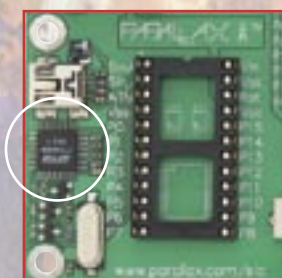
- Single chip USB to asynchronous serial data transfer interface.
- Entire USB protocol handled on the chip - no USB-specific firmware programming required.
- UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity.
- Fully assisted hardware or X-On / X-Off software handshaking.
- Data transfer rates from 300 baud to 3 MB (RS422 / RS485 and at TTL levels) and 300 baud to 1 MB (RS232).
- Transmit and receive LED drive signals.
- New 48MHz, 24MHz, 12MHz, and 6MHz clock output signal Options for driving external MCU or FPGA.
- Synchronous and asynchronous bit bang mode interface options with RD# and WR# strobes.
- Integrated 1024 Byte internal EEPROM for I/O configuration and storing USB VID, PID, serial number and product description strings.
- Integrated level converter on UART and CBUS for interfacing to 5V - 1.8V Logic.
- True 5V / 3.3V / 2.8V / 1.8V CMOS drive output and TTL input.
- Fully integrated clock - no external crystal, oscillator, or resonator required.
- 3.3V to 5.25V Single Supply Operation.
- USB 2.0 Full Speed compatible.
- Available in compact Pb-free 28 Pin SSOP and QFN-32 packages (both RoHS compliant).

NAME	STOCK №	PRICE
USB TO SERIAL ADAPTER	800-00030	\$19.95

Parallax has tested most USB-RS232 adapters on the market with our products and this one is the best! We chose it because it uses the FTDI chip and their assortment of drivers for different operating systems is superior. FTDI has demonstrated that they can provide fully functional drivers, maintaining and improving them as operating systems change (such as Windows). This adapter works with all of our products. If you don't have a serial port on your machine, this is an easy solution. To use this adapter, simply plug it in to your machine's USB port. Next, point the operating system to the appropriate driver. Then, add the driver port to your Parallax BASIC Stamp module, Javelin Stamp module, or SX-Key software IDE and you're ready to program with a virtual COM port.

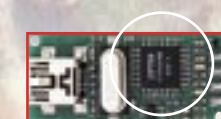


**Parallax Applications of the FTDI USB to Serial Chip**  
Parallax uses the FTDI USB to Serial chips in many of our products, as shown below. The FTDI chip is ideally suited for high-volume production.



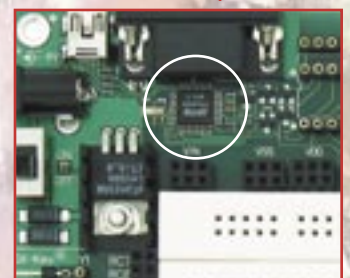
**Parallax USB Board of Education**

**Parallax USB Oscilloscope**



**Parallax USB to Serial Development Tool**

**Parallax Professional Development Board**



# Propeller™ Chip



## New Parallax Design Required Seven Years of R&D

**Note:** The Propeller Chip and tools will be released in 2006. Details are available on our web site at <http://www.parallax.com/propeller> and will continue to be updated as the release approaches.

What can you do with eight 32-bit processors (COGs) in one chip? Real simultaneous multi-processing! The new Propeller chip is the result of our internal design team working for seven years straight. The Propeller chip was designed at the transistor level by schematic using our own Altera Stratix tools to prototype. Propeller is programmed in both a high-level language, called Spin™, and low-level (assembly) language. With the set of pre-built Parallax “objects” for video, mice, keyboards, RF, LCDs, stepper motors and sensors your Propeller Application is a matter of high-level integration.

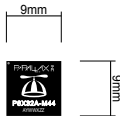


**Propeller represents the first custom all-silicon product designed by Parallax.**

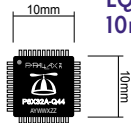
PROPELLER SPECIFICATIONS	
Model Number	P8X32A
Package Types	40-pin DIP, 44-pin QFP, 44-pin MLF/QFN
Parallax Stock Codes	P8X32A-D40 - DIP package P8X32A-Q44 - QFP package P8X32A-M44 - MLF/QFN package
Power Requirements	3.3 volts DC
External Clock Speed	DC to 64 MHz
Internal RC Oscillator	12 MHz or 20 KHz
Internal execution speed	Up to 64 MHz
Global ROM/RAM	64 K bytes; 32768 bytes ROM / 32768 bytes RAM
Processor RAM	2 K bytes



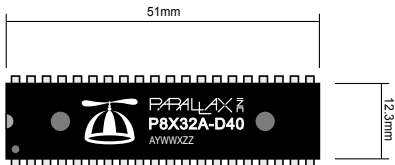
## MLF/QFN-44 9mm x 9mm



## LQFP/TQFP-44 10mm x 10mm x 1.4mm



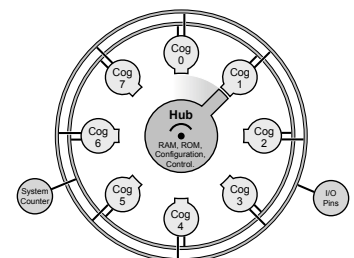
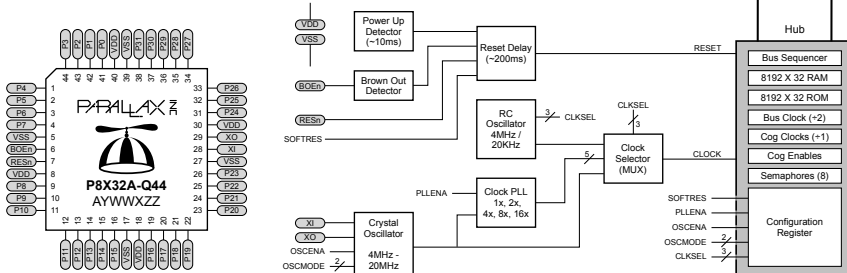
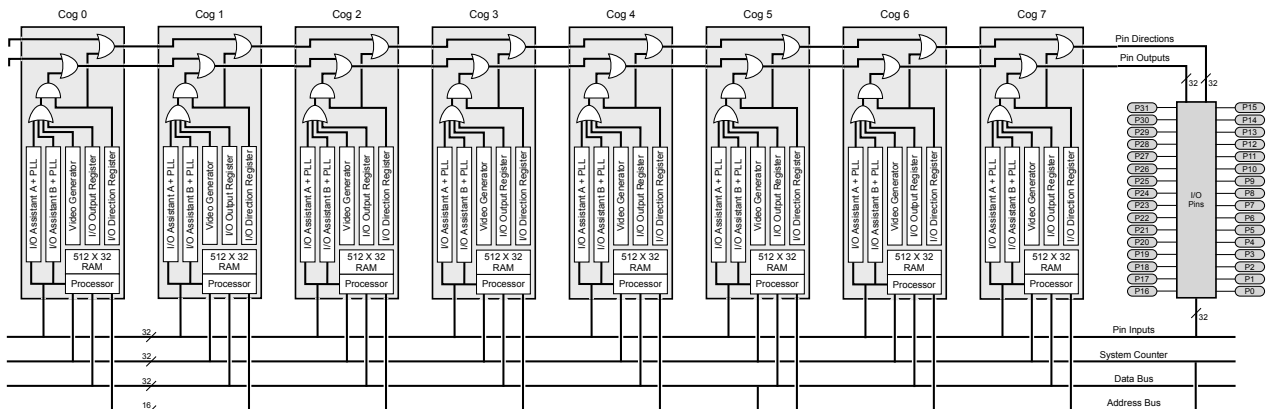
## DIP-40 600mil wide



Propeller Package Specifications

Propeller IDE

Propeller Functional Block Diagram



Hub and Cog Interaction

# How to place your order:

## Online Ordering:

**www.parallax.com** is the most popular way to order products from Parallax.

### *Why do customers shop online?*

- Order entry process is secure, fast, and easy to understand
- Order confirmation and tracking number are sent via email
- Exclusive sales and promotions

**Online orders** may be placed anytime through our secure server on **www.parallax.com**. On-line orders require Visa, MasterCard, or American Express and are shipped UPS only. Orders received before 2 p.m. PT will be shipped the same business day if all items are in stock. Orders received after 2 p.m. will be processed for shipment the following business day (Parallax's regular business hours are Monday through Friday, 7a.m. - 5p.m. PT).

*If you are unable to connect to the internet or if you prefer not to order online, we have several alternatives for you. Please feel free to contact our Sales Department at [sales@parallax.com](mailto:sales@parallax.com) or call toll-free 888-512-1024 if you have any questions regarding Parallax ordering policies, prices, and related information.*

## Phone Orders:

You may place your order by **telephone** during the hours of 7 a.m. to 5 p.m. PT. Customers in the continental United States may call toll-free 888-512-1024, and international customers dial (916) 624-8333.

## Fax:

You may send us your pre-approved Purchase Orders to the attention of the Sales Department at 916-624-8003. PO's must have a minimum purchase amount of \$100, and contain an authorized signature. To apply for Net 30 terms contact our sales department at 888-512-1024. Publicly funded schools are automatically pre-approved.

## Mail:

Send us Purchase orders, pre-paid orders with a personal check or money order addressed to:

**Parallax, Inc.**  
**Attn: Accounting Dept.**  
**599 Menlo Drive, #100**  
**Rocklin, CA 95765, USA**

**Note:** Please write "Order Enclosed" on the envelope.

# The Fine Print

## INTERNATIONAL CUSTOMERS

We encourage international customers to purchase through our distributors. Distributors provide reasonable prices as a result of consolidating their shipments, working with local customs offices and using preferred freight carriers. This usually results in a savings for the international customer.

Should you decide to place an international online order, the cost of shipping will be higher than if you order through a local distributor. Parallax is NOT responsible for any brokerage, customs fees, VAT, or country taxes that may be due upon the receipt of the package. The actual value of all orders is indicated on the invoice, and restatements using lower values are not permitted. The cost of the order would be higher than if you ordered directly from a distributor in your area.

## AUTHORIZED PARALLAX DISTRIBUTORS

You may order directly from us or from any of our Authorized Distributors. For a complete listing of Authorized Distributors, please visit our website. [http://www.parallax.com/html\\_pages/company/distributors/distributors.asp](http://www.parallax.com/html_pages/company/distributors/distributors.asp).

## ORDERING POLICIES

**Payment Terms** - Orders may be paid with VISA, MasterCard, American Express, check, or money order. Sorry, no C.O.D.s. Contact us at [sales@parallax.com](mailto:sales@parallax.com) for wire transfers. Customers desiring Net 30 days payment terms must submit three credit references and bank information and place their first order with a check or credit card. Approval for Net 30 days payment terms normally requires 2-5 days before the first order is shipped. A finance charge of 1.5% per month (18% annual percentage rate) will be charged on all past due amounts. Reasonable attorney fees will also be charged by seller in the event of any action proceeding for collection of the sums billed on the invoice.

**Shipping Methods** - Domestic orders placed on-line are sent by available UPS methods or via U.S. Mail (USPS). International orders placed on-line use UPS Worldwide Express. Orders placed by telephone or fax have the additional methods available: U.S. Priority Mail, DHL Worldwide, Airborne Express, or Federal Express.

**California Sales Tax** - All orders shipped to California addresses will be charged Placer County sales tax of 7.25%, unless you have a tax exemption certificate on file with Parallax.

## WARRANTY, REPAIRS, AND MONEY BACK GUARANTEE

**Quality Assurance**- Parallax, Inc. has stringent quality control procedures in place to insure the best quality products.

**90 Day Limited Warranty**- Parallax, Inc. warrants its products against defects in materials and workmanship for a period of 90 days. If you discover a defect, Parallax, Inc. will, at its option, repair, replace, or refund the purchase price. After 90 days, products can still be sent in for repair or replacement, but there will be a \$10.00 USD minimum inspection/labor/repair fee (not including return shipping and handling charges).

**14-Day Money-Back Guarantee**- If, within 14 days of having received your product, you find that it does not suit your needs, you may return it for a refund. Parallax, Inc. will refund the purchase price of the product in the same payment form, excluding shipping/handling costs, once the product is received. This refund does not apply if the product has been altered or damaged. If you decide to return the products after the 14-day evaluation period, a 20% restocking fee will be charged against the credit.

**Disclaimer**- Warranty does not apply if the product has been altered, modified, or damaged. Parallax, Inc. makes no other warranty of any kind, expressed or implied, including any warranty of merchantability, fitness of the product for any particular purpose even if that purpose is known to Parallax, Inc., or any warranty relating to patents, trademarks, copyrights or other intellectual property. Parallax, Inc. shall not be liable for any injury, loss, damage, or loss of profits resulting from the handling or use of the product shipped.

**How to return a product**- When returning, you must first call the Sales Department (toll free 888-512-1024) for a Return Merchandise Authorization number. No packages will be accepted without the RMA number clearly marked on the outside of the package. After inspecting and testing, we will return your product, or its replacement using the same shipping method used to ship the product to Parallax, Inc. within 15 days. In your package, please include a note with a brief explanation of the problem.

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Rocklin, CA 95765  
USA

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